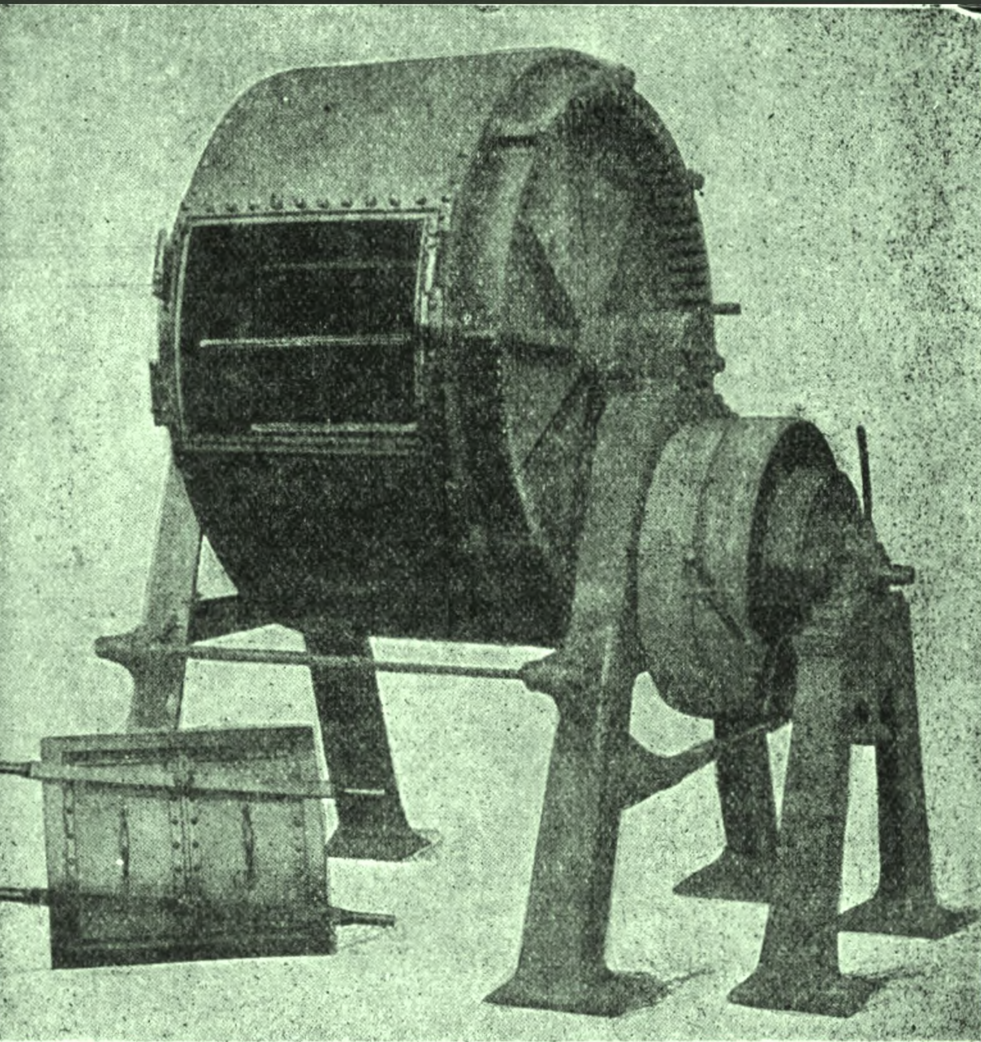

The Bakers' Guide and Practical Assistant to the Art of Bread ...

John Blandy

JOSEPH BAKER & SONS, ENGINEERS.

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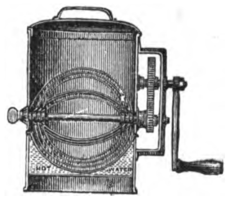
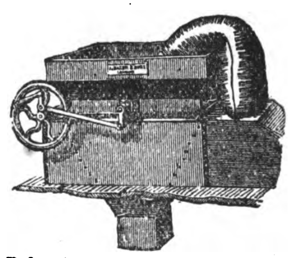


Whisking Machines.

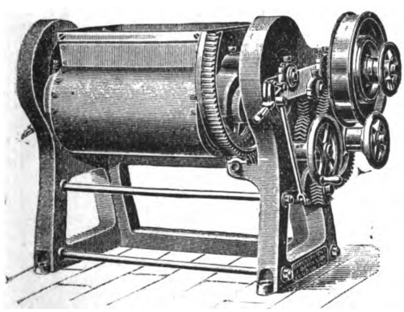
Highest Award, London, 1884.
Highest Award, Amsterdam, 1886.
Highest Award, Edinburgh, 1886.
Highest Award, Adelaide, 1887.
Highest Award, Barcelona, 1888.
Highest Award, Melbourne, 1888-9.
Highest Award, Paris, 1889.
Highest Award, New Zealand, 1890.
Highest Award, Chili, 1891.
Highest Award, Tasmania, 1892.
Highest Award, Kimberley, 1893.
Highest Award, Chicago, 1893.
Highest Award, California, 1894.

Patent Table Dough Divider.

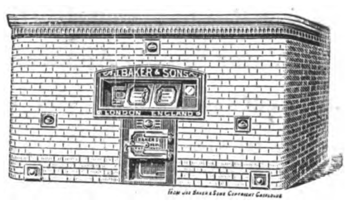
Bread, Biscuit, and Confectionery Machinery and Ovens.



Bakers' Patent Flour Sifting and Mixing Machine.



Bakers' Patent Dough Mixing and Kneading Machine. The Best on the Market.



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THE BAKERS' GUIDE

AND

Practical Assistant

TO

THE ART OF BREAD-MAKING

IN ALL ITS BRANCHES.

BY

JOHN BLANDY.

FOURTH EDITION.

LONDON:

NEWTON & ESKELL, 59 & 60, CHANCERY LANE, W.C.

1899.

PREFACE.

IT is with more than ordinary pleasure that I write the few words asked from me by Mr. Blandy as a preface to the *Fourth Edition* of the "Bakers' and Confectioners' Guide." The circumstances under which this edition is called for and published are unique, and reflect the greatest credit on Mr. Blandy. That a trade in which reading and study is so little respected should have already bought up three editions is a circumstance in itself remarkable enough, but it is more than remarkable when the text is studied. Mr. Blandy does not spare his trade, but talks out straight, and points out without flinching the sins and shortcomings to which it is addicted. I cannot agree with all the strictures set forth in the "Bakers' Guide," or subscribe to all the modes of reform the author suggests, but I can bear witness to the integrity and honesty of his opinions, and to the unselfish enthusiasm with which he has pursued the good and great work of reforming and educating the baking trade. He knows, as all reformers know, what it is to have his work disparaged and his motives misconstrued, but he troubles not, keeping his face well set to the work before him, and going heroically forward. He acts up to his ideal: "It is of no consequence whether the outside world says 'successful' to you or not; your concern is to get the 'well done' at the finish of the journey from the man inside your own breast." It is not a worldly-wise ideal this, it is rather heroic; but it is men with such ideals who do the pioneer work of the world, although the credit does not always turn their way.

The original edition of the "Bakers' Guide," published in 1882, was not the first book published for bakers, but there had been nothing of the kind issued for about thirty years before the "Guide" appeared, and the older works were either forgotten or

obsolete, and were only interesting as ancient literature. In each subsequent edition—and I have read them carefully—some new matter and new feature has been added; but the present edition—of which I have had the privilege of reading the proof sheets—is quite a *vade mecum* for the baker and confectioner, whether he is old or young, master or man. If I have a preference for the "literary" part of the work—those little paragraph sermons which Mr. Blandy can write so ingeniously and so forcibly—it may be because of a personal predilection of mine, but it is also because there is wisdom and wit in them, and because where they are not directly instructive, they are always stimulating and provocative of thought. Mr. Blandy is original in the sense that his individuality predominates in all he does and all he writes; he cannot, even if he tries, think of, write, or speak as the ordinary man, so that his literary work, however one may disagree with its purport, is always refreshing and always instructive. Since the last edition of this book was published the author has had the important experience of successfully teaching for several sessions a large class of bakers—workers, managers, and masters—at the Borough Polytechnic, London, and the result of his experience, or part of it, is now incorporated in the new edition of "The Guide." He has learned that bakers don't care about long arrays of figures and compound technical terms, and he has tried, and tried successfully, to teach technics in language as plain as possible. But as knowledge of technical terms is absolutely necessary to the student, all that are essential and some more have been incorporated in "The Guide," in dictionary form, for ready reference. The multitude of recipes given are useful to those in search of variety, or to those so situated that they must be their own instructors: to such this book will be a real guide. I could wish for nothing better for the baking and confectionery trades than that every young man would carefully peruse this new edition of the "Bakers' Guide," in itself it is a liberal education.

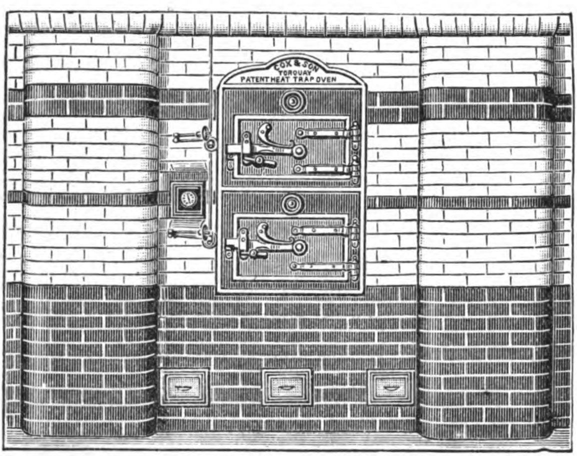
JOHN KIRKLAND.

INTRODUCTION.

Read This Page First.

IT is merely a synopsis of the matter in this book, but the reading of it will direct you where to look for anything special you may wish to see, and thus save you the trouble of turning over the *pages* to see if it is here. Though, of course, and it should not be necessary to say it—I think you will profit by it if you will read the whole book from cover to cover.—*J.B.*

The Patent Heat Trap Ovens are Superseding Steam Ovens.



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THE
BAKERS' & CONFECTIONERS' GUIDE.

CHAPTER I.

THE saying that nothing succeeds like success, to make it intelligible, should have the addendum—when it (success) means honour or money-getting, for where is the reward as an outward and visible sign attending the successful straightening of the hereditary twist in the moral character—the poverty bequeathed by ignorance turned into intelligent knowledge—the entering into combat with the selfish and brutal in our nature, conquering it and putting in its place the grandly beautiful character portrayed by Professor Huxley: "The man who has been so trained that his body is the ready servant of his will, and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a clear, cold, logic engine, with all its parts of equal strength, and in smooth working order, ready like a steam engine to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of nature and of the laws of her operations; one who—no stunted ascetic—is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of nature or of art, to hate all vileness, and to respect others as himself?" Is not this a stupendous success!—Brother baker, confectioner, miller—hampered with a consciousness of the lack of education and, worse, the possession of a nature mentally indolent, selfish, and perhaps brutally coarse—herein and elsewhere seek for stimulus and help to circumvent and overcome these defects. It is of no consequence whether the outside world says "successful" to you or not, your concern is to get the "well done" at the finish of the journey from the man inside your own breast.

In arranging the order in which the various subjects are treated in this fourth edition, my efforts have been more particularly

directed towards the setting at liberty the will, the stimulation of the desire, and therefore the promotion of a real and permanent appetite in the reader for a broader and more thorough knowledge of the technics, practice and commerce of his calling.

After more than a quarter of a century of learning and teaching (*qua docet dicet*) I have found that the iron rule of forcing the student to automatically acquire the precise lesson has had the effect of numbing and, partly at least, stultifying individual enquiry.

I have therefore placed in the earlier pages the general reading matter, which is made up of articles and notes, with the hope that the ordinary reader will find them of sufficient interest to repay the trouble of reading, and be encouraged to read into the technical matter.

The second section is devoted to Technical Education: What it is and how to obtain it? Technical students, to be worthy of the name, must be students in reality, not in fancy. They must acquire a theoretical and practical knowledge of that part of chemistry which applies to their craft. To achieve this, it will be necessary to learn at least the rudiments of general chemistry, nor should this fact hinder the most timid from undertaking such study, for what is chemistry but the means by which we get to know, to examine, all bodies which act upon the senses. It helps us to determine the properties of all animal, vegetable, and mineral substances; to determine the constitution of the atmosphere, of the water, and of our raw materials. The laws of hail, snow, ice, dew and rain, chemistry explains to us. Most of the processes in bread and confectionery making and the cooking of food are chemical operations, and knowing the chemistry of the process is to know the why and wherefore of it. Chemistry explains to us the reasons of the changes effected by heat, how substances in combination are to be separated, and how the union of substances and the formation of new compounds are effected; nor is chemistry dry and altogether serious in its study—if you buy one of the books on chemical recreations you will get many hours of real amusement out of it. The recreative interest in experimental research, production, and demonstration, has only to be pursued to be enjoyed. The occasional and unexpected explosion or flame, with the resulting singed hair and scorched flesh, will give you something to think and talk about for many days.

Chemical science has no politics and knows no side. It is a science of fact, and a study of it will teach us to be exact and accurate in our sayings and doings, and is just the sort of education needed at the present time.

The bread-making technical student must also dive a little into botany and biology, for how can he know what yeast and its

functions are without knowing something of the fungi family, their nature, uses, influences, and structure? Bacilli and bacteria are the baker's constant companions; he must become acquainted with them very intimately, so as to entertain them properly (for they are useful guests sometimes) and to teach them not to outstay or take liberties with their welcome.

The baker and confectioner to be quite sure of the degree of the boiling sugar, the heat of the baking chamber and liquids, must let go the cumbrous and uncertain testings of rule of thumb, and take to the thermometer, and therefore must read books which treat of heat and temperature.

I have dealt freely enough upon all these matters in the technical section of this book to encourage, I hope, a taste for more, but at the best the scope of the book will only allow of a taste, and not enough for a meal. Study the subject, buy the books here mentioned, and become a real student of the technics of your trade:—Church's "Food," Voller's "Flour Milling," Tyndall's "Heat as a Mode of Motion," Maxwell's "Theory of Heat," Sims Woodhead's "Bacteria and their Products," "Chemical Recreations," with the latest "Elementary Inorganic Chemistry," and the latest books on machine construction and the "Chemistry of Sugar." There is also in the dictionary, and technical matter in this Bakers' Guide much that you should read at once, for the many explanations will be very useful to you in your search for knowledge.

In the third section will be found all about yeast, all about flour, fermentation, and about our raw materials.

In the fourth and last section I have grouped a large number of processes and recipes for making up many different varieties of bread, cake, pastry, confectionery, and biscuits.

Nothing is too small to teach or to learn; it is only relatively that any man is wise or foolish. There may be those who do not know quite so much, but there are also those who know much more than we do. It is no disgrace for the oldest workman to be willing to be taught that which he does not know, or that may not have come within the scope of his experience. It must be remembered that a complete knowledge of the baking and allied trades of cooking, confectionery, and cake-making cannot be acquired fully in a lifetime; there are fresh creations every day, and the young man who is widest awake usually finds out or acquires the most extensive and varied information. Therefore, keep your eyes open, and cultivate quickness of perception and smartness of action; and if you do work out something new, don't let it die with you, give it to the trade—many a useful improvement dies with its possessor, because he is jealous of

another knowing as much as himself; when you teach you make a path for others to walk upon.

In the workshop, as elsewhere, "knowledge is power." The more extended and varied the better. The workman should have his head full of information about his work, so that in the moment of need memory or reflection can bring out just the knowledge required to perfect the work in hand. But knowledge or natural gift, be it ever so great, will not suffice. If a workman wants to take the front rank in the trade he must have more than these—he must have right principles to go on; principles are to character what concrete bottoms are to buildings. To have a solid character there must be a solid foundation; therefore have a good governing principle, a rule that shall be the plumb-line, by which you will be able to see if any act is out of the *square*, or such as would interfere with your determination to walk uprightly. Make up your mind at the start what is to be the object of your life; don't be like a cork on the water, blown hither and thither by every wind, and at last safely landed in the corner of some muddy creek. Don't leave chance to make your future—that trust is vain. If you expect to attain honours you must first work to win them. Don't be heavy hearted and doubtful of success, persevere. Inexperience and youth are followed by ripeness and wisdom; the scholar of to-day is the teacher for to-morrow. Don't fail, when you have obtained useful knowledge, to impart it to those around; "imparted knowledge does not diminish learning's store." Cultivate self government, let "patience have her perfect work, be not hasty in spirit to be angry." Don't browbeat your brother workman if you have occasion for the expression of a different opinion or to administer rebuke, do it with firmness and moderation. Employers, do not browbeat and bully your work-people; a tyrant who drives and curses seldom has faithful servants. The obstacle in the way of strikes is a kind employer, but if he ignore the remembrance that the operative is also a man like himself, with the same needs of flesh and spirit, the same duties of husband and father, in providing food, clothes, education, and habitation; if employers neglect the display of humanitarian principles, then though they be wise business men, though they be progressively successful business men, they are also progressively successful brutes, promoters of strikes, and aiders and abettors of drunkenness, profanity and crime, for men treated as beasts become beasts, kindness is a strike antiseptic—*Be Gentlemen All.*

Be clean. Every workman who has any proper pride in his work, or who would be counted a true workman, will be clean in more senses than one—clean tongue, clean flesh, clean

utensils, clean work—for if a little loose flour or "cones" were allowed to adhere to the loaf his work would be badly finished, and he would be deemed untidy; but how much more would this be the case if he were dirty in his person, and touched the dough or batter with unwashed hands! Every time he did so touch it, it would not only be abominably dirty, but he would also spoil his work, and of course frustrate his future preferment. A man who would come from handling the tins, the peel, or the scuffle, etc., to mould any of the fine fancy breads—such as crescents, twists, vienna rolls, or any clear "green" dough—would spoil them for appearance and for eating. Watch him closely, or keep him to wait upon the others and do the drudgery. Dough will clean out the interstices in the hands in such a way that any decent workman will use plenty of soap and water if he can get at it. Cleanliness *is not* next to godliness in any other sense than being a good habit; or any nearer than honesty, charity, etc. Cleanliness is, however, one of the good habits that are essential in connection with food; therefore clean habits always form one of the planks of a good character, which, when engaging a man, should be as much sought for as honesty itself.

Bakers and Confectioners should have good "understandings," old boots "try" the feet very much; don't wear them in the workshop. If a workman is bad on the feet it will impair his usefulness. In the fabrication of bread he has no idle members—head, hand, heart, and foot, are all under contribution at one and the same time. Old shoes and clothes are not only uncomfortable, but they are untidy, and do not enhance the value of the workman. It will not cost much to have a light material neatly made up for bakehouse wear. Consider, too, that a baker spends two-thirds of his waking time at work, under very heavy pressure; surely, then, some special provision should be made for good and suitable clothing for that "two-thirds of his waking life." Baker and confectioner, wear the working dress that will dignify your calling, not degrade it.

"Keep time." Few things tend so much to create contention as irregularity in the order of work. Backward work has to answer for much unparliamentary language in the bake-office and shop. The clock should be large faced, and hang in a prominent place. A workman, who "takes pride in the work" and desires the goods to be up in time, will instinctively watch the clock. Gossip, joking, retailing the news, and argumentative discussions are alike out of place when there is a lot of work about; when this is indulged in, and becomes general, it is a dead certainty, whether "the favourite wins" or not, that the goods will be half an hour late at the finish. Always be "on time."

Pins and nails, pieces of wood and stone, are very bad things to digest, and, moreover, are not at all conducive to longevity; therefore, pins should be strictly forbidden within the precincts of the bakehouse. Should "rents" occur and buttons come off, seek the assistance of some kind mother, or use string or sack tiers, but, if you please, no pins; neither should boxes of peel, currants, or sultanas be opened nor sifted and picked, upon the dough-tables or trough-lids, or it will be nearly impossible to prevent some of the débris, nails, etc., getting into the cracks and falling through on the flour or other raw materials that are about.

The System of Business for Progressive Men.—Price, Credit, Canvassing, are questions the understanding of which need give you no anxiety, as they will have no place in your business. You are proposing to open a bakery and run it upon progressive lines, upon the assumption that there is room for it in that particular town or district; and regarding the price at which to sell, your wisdom will be to adjust the mode of trade and sale, so that the turnover at the end of the quarter or half-year will show a fair profit on expended capital and brains, and the price must be adjusted to give that fair profit; you have no right to more, and should not be satisfied with less. "Money" should not expect more than four or five per cent., and labour as working master should be charged for at the amount it would be worth in the labour market as a manager.

It is preposterous to expect, as many do, a fortune from the investment of a few hundred pounds. If you invest £5,000 and also work personally in the business, you should expect and have £200 per annum as interest at four per cent.—being a safe investment—and £250 as salary, which will be as much as the manipulation of £5,000 is worth. This will give £450 for capital and management. I would not send out canvassers or buy customers by "tipping," simply because it is wasteful, not because there is any impropriety or sharp practice attached to these trade customs. If your bakery succeeds in the purpose for which it is opened—that of attracting trade—it will be by displacing some of the existing baker's trade. *Every gain of a customer means the loss of a customer.* There is quite a lot of nonsense talked about canvassing, objectors forgetting that the increase of business in their own case could only have been obtained by taking it from other bakers. If they have not canvassed for it they have had no need to do so. The favoured position of their shop, the natural grace of their person or the superior quality of their goods — underselling in quality, as it is termed—have, in their case, rendered canvassing unnecessary. To send a card into a lady and to solicit

an order to supply her with bread, is in no degree less respectable or praiseworthy, than the calling of the flour seller upon you at your shop to solicit an order for flour. Many traders who sneer at the practice of canvassing for customers in their houses, have no objection to canvass them as they pass along the street by an enormous show of goods and well-dressed windows, which will result in waste and stale goods, to be sold next day at less than cost price.

The only forcible and sound objection to canvass for business by miller or baker, or to the sale of waste and stale goods, is that it must add to the sale price of the article. It is therefore unsound and should not be practised. For the same reason I consider the Credit System is also unsound, and must not be a plank in a progressive baker's platform. It handicaps progress very severely. In the ordinary family baker's trade the amount of locked-up capital is from 8 to 10 per cent. of the entire turnover. If the annual turnover is £5,000, taken at an estimate of 7½ per cent., £375 will be wholly unproductive by being always upon the books as current credit accounts. It does not affect the calculation whether the credit given is one week or more. If paid every week, the current week is being put on the books at the same time the past week is being taken off. To put it roughly and in round figures, if you total up the amount unpaid on an ordinary "family baker's" ledger, the turnover being £5,000 a year, on any and every day of the year you will find not less than £400; in many cases it will be over £500. To put the case yet more strongly, for every £100 worth of trade done, you are only able to handle and use £90 of it, considering the power of cash to buy is 2½ per cent. off in most cases, and that in the baking trade, where stocks are turned over at least every three months, which will make this 2½ into 10 per cent. for the year; 10 per cent. on £500, the sunk or locked up portion of the turnover will be equal to 1 per cent. on the total turnover of £5,000; now add 2 per cent. for the cost of clerical work of this credit trade—it cannot be well done cheaper—and 2 per cent. for bad debts and actual money outlay for stationery, and you have as absolutely the minimum cost of a credit trade, a clear loss of 5 per cent., which is tantamount to the loss of every cent. to which the invested capital is entitled, and every pound paid out of the business to invested capital has been a pound unnecessarily put upon the retail sale price, the retail cash buyer having had to pay in excess of the fair value of the loaf In the majority of credit shops the person who buys direct from the counter puts the cash down, and—without the sometimes grudged piece of paper for wrapping—takes away the loaf, pays exactly the same price as that charged when it is sent a mile, and the

account for it is sent in and brought forward on the ledger several times before it is paid for.

C. O. D. is the only form of payment allowable in a modern system of business, especially a baker's business. A loaf of bread or a cake is not like a shovel or hammer, or even like boots and coats; all these things take some time to wear out, but a loaf is consumed at once, and like a ride in train or 'bus, cannot be recovered, and therefore should be paid for on the spot. Ready money buying, if used with care, will always obtain the best value, wholesale or retail. It is because bakers think they can hold their customers surer that they like the credit family trade, and being sure of them are tempted to *make them pay*. But the days of harvest in this respect are rapidly passing away, for ordinary buyers are beginning to understand the value of ready money and the power of choice cash buying gives them, and the credit baker is becoming what the credit grocer has already become, merely a convenience for the needy and a mark for the swindler. It does not involve the possession of a knowledge of mathematics to know that if a baker can afford to send a 3d. loaf a mile, enter the transaction in at least two books, send in an account and wait a month for the money, he ought to be able to supply it for less to the person fetching and paying cash for the bread; thus saving cost of books, bills, wear and tear of baskets, barrows, carts, loss on the amount of locked-up capital, and worse—the actual loss of money through bad debts.

The Glamour which Credit Trading seems to throw over well-informed business men is not understandable by ordinary reasoning; though they have a forcible object lesson confronting them in the firms analogous to their own in product, who are obviously going straight and quick towards the prize of a big business and a big annual income upon a cash system, yet these smart business men allow themselves to slowly drag behind in the old-fashioned credit coach. Credit is a most hideous monster, conceived, brought forth, and kept alive by ignorance. It is more destructive of nett profits than the greediest of lessors and ground landlords, the shortest and worst of repairing leases, and the most exacting of strikes. This is the "bloated aristocrat" who, gorged upon bad debts and the work of clerical departments, sits upon the chest of interest and principal, absorbs the reserve fund, and causes perpetual nightmare to traders; that preys upon the vital energy of commerce, and wastes it; that keeps large numbers of capable people employed with the sole duty of feeding its hungry maw with bills, invoices, statements, postings, and writs. But notwithstanding all this, notwithstanding that those who have driven this credit fiend away have "mounted up with wings of eagles," have reached the prize quickly, notwithstanding

that the dead and the dying victims of credit lie thickly everywhere, that such numbers of the clever and beautiful of our youth are kept in bondage to his service, that he is the cause of suicides and lunacy, that bankruptcies are his doings, and that the underpaid workpeople are frequently the outcome of his greedy assimilation of profits, notwithstanding that he causes madness, severs friends, peoples the workhouse, the suicide's grave, and the madhouse, credit is still courted and welcomed by the majority of traders, is sought after, aye, and purchased. Woe is me, for I am undone, for I live in the days of the reign of King Credit, and mine eyes have beheld and wept over his victims; one would wish with Jeremiah to have fountains for eyes, that the continually flowing stream might attest the sincerity of my sorrow.

The Price of Bread. The Press of England reflects no only the real grievances, but the fleeting thoughts and fancies, of the public mind. It is, therefore, quite natural to expect that the leisure hours of letter-writers should find expression in the columns of the daily papers on the price of bread. We do not think, however, that many of those who complain in print are genuine representatives of the working-classes, though this circumstance does not deny them the right of discussing this or any other question affecting the interests of the poor; provided always that such amateur champions take the needful pains to acquaint themselves with the facts at issue, and that they *truly* represent a real grievance. Many of the daily and weekly papers, in their editorials, are but very little above these fugitive letters in the justness and accuracy of their remarks when attempting to fix the guilt of unjust prices upon the bakers—a body of men who, after all, occupy but the last, the most laborious, and consequently the least remunerative, place among the classes who deal in corn and flour.

Outside the trade there is a dangerous *penchant* among literary men for settling questions of public interest by arithmetic; but it is just one of those ways of stating a case in which general readers should place but little confidence. We see a result, but do not see how it was arrived at, or whether the whole of the figures germane to the matter have been taken into account. For instance, it is a *fair-looking* statement to say "a sack of flour costs 25s., and produces ninety quarterns of bread, for which the baker charges 5d. per quartern, at which price it returns 37s. 6d., and allowing 6s. for cost of production and distribution, it gives 6s. 6d. profit." Yet this, notwithstanding the use of figures, is a very imperfect statement; but it is the usual way of putting the case, and would be conclusive were it not a fact that some of the most important figures are left out of the calculation. The truth

is, there are factors in the case that will not *dress up* into a sum of this kind. We will name a few of them.

Notwithstanding the most anxious thought and endeavours to anticipate the *probable* orders of his customers the baker will occasionally make too much. Changes in the weather will affect the demand; a sudden flush of cheap fruit or vegetables in his neighbourhood which he could not have foreseen, also reduces custom; and, though he may clear out to-day, to-morrow he may find himself overstocked. Temperature must also be taken into account in the manufacture, as it affects the fermentation and sometimes spoils the entire batch. *This excess and waste bread must be taken into the calculation; all the ninety quarterns must be sold and the money obtained for it, before the profits can be estimated.*

Flours are not all of one quality, and consequently there can be no uniform yield of bread; nor are they of one price, so there can be no uniform profit.

There are bad debts, wear and tear of plant, that must be tacked on to the cost of production; to say nothing of rent, rates, taxes, all of which must come out of this 6s. 6d.

Education, science, art, sanitation, and even philanthropy itself cost money, as ratepayers everywhere know too well; and bakers, among others, have to bear their share of the burden.

The price of bread is affected, as well as that of other commodities, by the vast number of persons in the world who "toil not, neither do they spin," though some of them pose as the advocates of a cheap loaf to wile away the time.

There is a law of compensation in trade as in nature by which prosperous years bear the burden of unprosperous. The farmer looks to a good harvest to recoup him for the failures of the past; but if the public are to step in and reap immediately the whole benefit of his good harvest, his former hopes would be nullified. The public should be regarded as partners in the profits and losses of their tradesmen, but not in the profits until the losses are adjusted or compensated for.

The present low price of bread has been reached before during the last twenty years, although the price of flour has never been so low; this simply means that an article may be sold at one time below its value owing to an excess of capital, production, or competition; *but the public are doomed to defray that loss sooner or later.* In the production of bread there are all these elements of excess: Among the financiers at the head, too much capital (or credit), limited only by the ability of the public to buy; among the millers too great a production—Rollers once started must grind on, even at a present loss, for which, however, the people will have to pay by-and-bye; too many producers; an

army of small bakers, the excess of whom the public must undoubtedly support.

This subject, for many years, has had expended upon it the anxious thought and tireless energy of a number of earnest, intelligent men, belonging to both the milling and the baking trades. Men who have taken an unselfish interest in the moral as well as financial improvement of the trade; who have tried "moral suasion," 'coercion," "purchase," deputations to millers and bakers *ad lib.*; and who have spent many weary hours in conference and council, advancing and refuting, pulverizing and sticking together again, every argument that could be thought of, read, or written upon this question of getting a uniform price for bread.

With the memory of these efforts full upon me, I would not thoughtlessly intrude, nor must it for a moment be thought that I enter the arena to thrown down the gauntlet and to join the combatants. I come with the basis of an armistice, with a flag of truce, and to persuade bakers to cease this barren fight—you do but "kick against the pricks"; this is but a question of cause and effect, which is paralelled in the "'bus," boot and clothing trades, in matches, in sugar, and in many other things, not overlooking labour and capital—the chief of all.

It may seem a little cold-blooded to talk of patience to drowning men, but nevertheless, as matters stand, patience is absolutely necessary; the trade has come into a rich inheritance, and everything connected with the milling and baking trades is in a state of transition. It is impossible to work upon the old lines: uniformity of price can only be thought of now upon a much wider basis; *there must be at least four standards of prices* to meet the values of the different varieties of flours—this is becoming quite plain to anyone who takes in the abnormal growth of the varieties or classes of flour. During the last fifteen years the difference of value is most marked—ranging from fourth grade or seconds at 19s. up to supers and patent purified middlings at 30s., and Hungarian at 37s.—and this difference is being *increased* every year. Before, therefore, we talk of a fixed price, these qualities of flour must be separated into *four* classes, to meet the demand that exists: (*a*) among the very poor labouring classes; (*b*) the superior mechanic and tradesman; (*c*) the middle and professional; and (*d*) the upper aristocratic classes—each of these classes is well defined in their style of living, and their bread-supply could be easily adjusted.

Free-trade has undoubtedly brought too many competitors into the home flour-market, but it is one of those good principles that, though they disturb for a time the social earth they are in contact with, it is only the disturbance caused by the breaking up of bad concrete customs, and all will right itself by-and-bye for the

nation's good. Though free-trade has increased competitors it will end in squeezing many of them out altogether.

In the case of ignorance of political economy it will be necessary only to educate—educate—educate. There must be drawn up and printed, for the use of juniors and others taking shops, accurate tables, showing the true cost of production and distribution, inclusive of wages, rent, rates, taxes, insurance (life and fire), with light, fuel, repairs, wear and tear of *person* and plant, etc. Then we must have instruction how to "keep books," how to ascertain profits, how to find out the number of quarterns of bread to the sack of flour, and how many shillings a sack so much per quartern will return. There must be teaching of a higher kind as to the morals and duties of the trade, and young men should go to the Bakers' Institute to learn the technics as well as the practice of how to make and *sell* bread.

In connection with this question of the price of bread, it is my duty to tell these fugitive letter-writers, consumers, and the public press, that they are themselves chargeable with the loss of a farthing a loaf by their culpably careless violation of the economic law governing supply and demand.

I have said that one cause of loss to the baker which the public must pay for is that the baker has to make bread to meet *probable* orders. Mrs. Blank takes in three loaves from the man when he calls to-day, but to-morrow she does not require any; now what difficulty would it be for Mrs. Blank to have said she would not require any bread on the morrow? None whatever; and this causes needless waste of good bread, good bread which in large quantities all the year is sold for pigs' food, and won't even fetch that market sometimes, and has to be thrown away, and is therefore so much waste of profit. Again, have bread buyers any idea of the waste of profit there is in their habit of running up a bill? A paltry 2½d. loaf involving the whole paraphernalia of office, clerks, books, and the loss of another farthing. It is in just those circles where there is money that it is most difficult to get this 2½d. in ready money and where the chief of the grumbling letters come from.

The consumer is also solely responsible for another profit-wasting as well as unwholesome usage, namely that of changing stale bread for new—Mrs. Blank coolly says, "None to-day baker, but give me a new loaf for this stale one," and is highly incensed if he demurs, though most likely he has more than he wants already, and it will only go to the pigs. Apart, however, from this sin of waste, I demand in the interests of the public health, upon sanitary grounds, that this unwholesome custom shall be abolished. The bread may have been handled by hands befouled with unthinkable things, by persons suffering from acute phthisis, or taken

from a damp slimy pan or cupboard, positively reeking in mucor mucedo, bacillus subtilis and bacterium termo, or from a room where the known or unknown presence of the bacilli of typhoid and scarlet fevers and small pox are lurking. Ugh! the mere thought of it is enough to make one break through habits of abstinence and drink brandy.

Immediate reform in these various matters can be easily effected by a mutual agreement between the baker and his customer, and as the continuance of these abuses is inimical to the interests of both it should not be delayed. If the Associations will prepare a circular-letter, and ask the help of the daily and weekly press to make it known, there will be no difficulty with the public, for it will not only mean cheaper bread to them, but also the saving to the nation of much valuable food-stuff for its people that at present finds its way to the dust heap.

Bakers have only themselves to blame for much of this unreasonable press criticism, from the fact that they have no standard of gross and nett profit, and therefore for the lack of such a recognized standard, bread that is made from the same value and quality of flour is sold at different prices in different towns, and at different prices in the different streets and districts of the same town. It is urgently necessary that such a standard should be at once attempted, nor is there apparently any sound reason why it should not be. A conference of delegates from the bakers' societies from all parts of the country could be expected to agree upon a fair standard of gross profit, and that standard arranged, a note sent to the press associations as to a rise or fall in the price of the loaf, would by the London and provincial press convey the fact to both baker and public. The baker could be trusted to rise, and the public would look after the fall, and in a short time it would become as accurately automatic in its operation as that of the press quotations of stocks and shares. The severe publicity of this would act also upon bakers who would take any unfair advantage. For public opinion when properly educated is very sound, and few bakers would find it pay to face an adverse public opinion.

Something of this sort must soon be arranged by bakers, or the Government must do it for them, for it is obvious that their present mode of doing business cannot be tolerated in connection with an article of commerce of such importance to the nation as its daily bread.

Such a standard would also simplify the adjustment of the differences between the employer and the employed.

The following sketch of the outlines of a possible standard may perhaps suggest a way out of the maze :—

Take as a base for a standard for household bread, either second patents or households, these at the time of writing are 25s. the 280 lbs. We will put the—

	£	s.	d.
Price of flour, 280lbs. ...	£1	5	0
Cost of labour to make into bread		3	6
„ „ sell and deliver		3	0
Yeast, salt, and fuel ...		1	3
Rent and taxes		1	0
Wear and tear, fire insurance...			9
	£1	14	6
Yielding, after allowing for waste, 90 4-lb. loaves at the present price of 5d.	1	17	6
Nett profit	£0	3	0

Therefore the standard retail price for bread made with flour costing 25s,, is 5d. per 4-lb loaf. Whites and 1st patents being 4s. more per 280 lbs., would therefore be 5½d. per 4-lb. loaf as a standard.

It may be pointed out that 3s. per 280 lbs. as a nett profit is very low and not enough. In answer to this objection, I reply, that a full allowance has been made on labour, which will leave the master very little to do, and if the output is only twenty sacks per week, that would bring in 60s., and that is ample payment for the very little mental and physical effort he has to put forth. If the master is energetic, and does manual labour, he will displace some of this, and of course take the extra profit, which is his rightful due. There may be extra work and worry entailed by the making and selling of flour confectionery, and other goods—quite so, but that has nothing to do with the loaf, they must bear their share of cost and yield their own profit.

It may be objected further that there is no allowance for bad debts. Certainly not. Mrs. Blank, who pays cash, must not be asked to finance the loss through Mrs. Blink who does not. You risk upon Mrs. Blink, make her pay ½d. more for the risk.

Nor is the sum for rent too small. It is quite enough if a fair trade is done, and if the baker takes a highly-rented shop with but a small output, it is a bad bargain, and he must bear the loss of some of his 3s.; he has no right to make the public pay for exorbitant and fancy expenses.

The extra cost too (to make) of small and fancy bread, have nothing to do with a fair standard for the ordinary loaf; they do (or should do) return an extra price.

CHAPTER II.

THE GERM OF CHEMISTRY AND THE BIRTH OF TECHNICS.

VOLUMETRIC Estimation of Albuminoids in Flour and Bread. (Barker-Smith Method.)

These methods I have found to be both practical and useful in my various classes, and, as I am desirous of increasing their sphere of usefulness, they are reprinted here from Dr. Barker Smith's work by his permission. (Sold by the Rebman Co., Ltd., 129 Shaftesbury Avenue).

The student's set is all the apparatus required for the *thermometric estimation of ammonia, proteids in flour and bread, alcohol, citrates, cream of tartar, syrups, glucose, solutions, etc.*

Abbreviation: "**Centim**" used for gram volume or c.c.

Measure one centim of the official 1 per cent. solution of potassium permanganate into a hundred centim flask, add six centims of dilute sulphuric acid, dilute the mixture to a hundred centims with water.

Norme.—Fifty centims of the above acid permanganate solution; used *invariably* for *recording*.

Subnorme.—Ten centims of the above acid permanganate solution; used almost invariably for all experiments.

Method.—Pour a subnorme into a two-ounce flask. Fill a ten centim pipette with the albuminous solution. Take the two-ounce flask between the finger and thumb of the left hand and the pipette in the right hand. Shake the flask continuously, and deliver the albuminous fluid *regularly in running drops* until the last trace of *pink* shall have disappeared. Time should never exceed thirty seconds. Milk diluted with five or ten parts of water should be used for practice until regular results are obtained.

Standard.—Four centims of a 1 per cent. solution of the *water-free* albuminoids decolourise the *norme*, or ·8 centim the subnorme.

Rule.—The *constant dividend* is *four*, the centims which decolourise the norme are the *divisor*, and the quotient is the percentage of *albuminoids* in solutions of albumens.

The same method is applied to the estimation of *ginger*, *cinnamon*, *aromatic essences and waters*, *cochineal*, *carmine*, etc., using suitable standards for each substance.

Flour and Bread.—Weigh 1 gram of flour and place it in a small mortar, add a teaspoonful of water and triturate it diligently *for one minute* with the pestle, now add *four centims* of solution of potash (official liquor potassæ), mix well for 20 seconds, and add water gradually to a hundred centims, so as to make a 1 per cent. mixture of flour.

The flour is then estimated as an albuminous mixture or solution. For such weak albuminous solutions the constant dividend is *three and a half* instead of four. The calculation, always simple, is further simplified by using a table referable to the results obtained by the *subnorme*. Suppose the *routine* 1 per cent. flour mixture is used, the constant dividend for subnorme is *seventy* (·7 by 100), and the quotient is the *percentage* of *total albuminoids* in the *flour*. The four centims of liquor potassæ would be sufficient for a food-stuff containing 50 per cent. of albuminoids.

Table for 1 per cent. Flour Mixtures; Referable to the Subnorme.

Centims Decolourising Subnorme.	*Percentage of Albuminoids.*
5·0	14·0
5·5	12·7
6·0	11·6
6·5	10·7
7·0	10·0
7·5	9·3
8·0	8 7
8·5	8·2
9·0	7·7
9·5	7·3
10·0	7·0

Ginger.—A gram of good ginger was made into a decimal tincture with rectified spirit, *i.e.*, the ginger was extracted completely. One centim of this decimal extract of ginger was diluted with water to 10 centims so as to represent a 1 per cent. solution of ginger.

Of this centesimal solution 3·6 centims decolourised the subnorme or *eighteen* centims the *norme*. Hence the constant dividend for *ginger* is eighteen, the divisor is the centims decolourising the norme, and the quotient is the percentage of *ginger*.

Thermometric Estimation of Albuminoids in Flour and Bread. (Barker-Smith Method.)

Pour good official chlorinated soda solution to the 5 centim mark in a half ounce phial, ascertain the temperature by means of a small thermometer, and mark the temperature down. Add *half-a-gram* of flour, of the same temperature as the chlorinated soda, stopper the phial and take it by the rim and shake it briskly, about 10 seconds, without adding heat from the fingers; remove the stopper and insert the thermometer, the temperature gradually increases in ratio to the percentage of albuminoid, and the final temperature or *acme* is obtained in about four minutes. The degrees of temperature Fahr. correspond almost exactly to the percentage of albuminoid in the flour. Bread must be added in crumblets. In the case of milk or strong solutions of albumen, 1 centim is measured into the phial, and the degrees Fahr. multiplied by the factor ·6 afford the percentage of albuminoids. For example 1 centim of milk afforded 6 degrees of heat, *i.e.*, 3·6 per cent. albuminoids in the milk (·6 × 6).

Thermometric Estimation of Starch, Glucose, Maltose, Tartrates, and Citrates. (Barker-Smith Method).

For these substances another oxidiser is used instead of the chlorinated soda. This oxidiser is 4 centims of 4 per cent. solution of potassium permanganate, and 1 centim of dilute sulphuric acid. Albuminoids also respond as in method **B.** One gram of finely ground wheat was mixed and made with water 20 centims by measure, the whole was kept stirred in a small mortar and 1 centim of the mixture measured off by a 1 centim pipette. The heat evolved slowly, and reached an acme of 3·5° Fahr., or 70° for the gram of wheat-meal. The heat evolved by the albuminoid portion of the wheat meal ascertained by the other method was 21·5° Fahr. The first aspect of the experiment gives the following results :—

21·5 × ·6 = 12·9 per cent. albuminoid.

48·5 × 1·8 = 87·3 per cent. starch.

Now a gram of starch in a similar manner afforded 60° Fahr., dextrin 90°, albuminoid 182°, maltose 240°.

Hence the factors for these various substances are respectively 1·8, 1·2, ·6, and maltose ·45. So we see both the rationale of the method applied to cereals, and that the starch percentage is too high. Three simple experiments give us the

essential facts of a decimal water mixture of bread and biscuit stuffs, *e.g.* :—

1. Chlorinated Soda Solution, *albuminoid heat evolved.*
2. Strong Acid Permanganate, *albuminoid and carbohydrate.*
3. Supernatant Portion, *dextrino-saccharines.*

Saccharines are estimated in 5 per cent. solution to obtain standards, from which data the various saccharine solutions may be estimated. For example: one gram of cane sugar was dissolved and made 20 centims with water. Of this solution 1 centim afforded 9° Fahr., *i e.*, 180° for the gram of cane sugar; we see that a ½ per cent. solution of sugar would afford nearly *one degree* of heat, hence the constant factor for cane sugar is ·55, or nearly the same as that for albuminoid. All syrups suitably diluted can be estimated. Degrees evolved multiplied by factor and by dilution. One gram of glucose in the same way affords nearly double the temperature of cane sugar; an experiment indicated 330° Fahr. so that the factor is approximately ·3 for glucose. Dextrose is still higher, and approaches *tartaric and citric acids.*

Citric Acid.—One gram dissolved in 50 centims of water, of this solution 1 centim afforded 7° Fahr., or 350° for the gram of citric acid, the factor is, therefore, ·28. For example, 1 centim of lemon juice from a squeezed lemon diluted with water to 3 centims, of this solution one centim afforded 11 degrees of heat, corresponding to 9¼ per cent. of citric acid, viz. :—

$$11° \times ·28 \times 3 = 9·24 \text{ per cent. citric acid.}$$

During one minute the temperature of citric acid solutions are scarcely noticeable, during the next minute the temperature rises with effervescence, and the whole experiment is concluded in three minutes.

Tartaric Acid.—One centim of 2 per cent. solution of tartaric acid afforded 8° Fahr., or 1 centim of 1 per cent. solution 4°· Hence the factor for tartaric acid is ·25. For example: 1 gram of cream of tartar put in a small mortar with a little water, and a few centims of potash or soda solution added to dissolve it, and the whole made up with water to 20 centims. Of this solution 1 centim afforded 13° Fahr., or 1 gram of cream of tartar 260° Fahr. The factor for cream of tartar is, therefore, nearly ·4. By making our own standards *cream of tartar* can be accurately estimated by thermometric oxidimetry. So alcohol, glycerine, honey, malt extract etc.

Estimation of Copper Reducing Sugars.—Dr. Barker-Smith uses two methods in routine work.

(*a*) One centim of Fehling's solution is measured into a graduated test and gently boiled, the weak saccharine solution (½ per cent.) is added drop by drop until the *last trace* of purple has disappeared. The points are, to keep the copper solution gently boiling throughout, and to bring critical observation to bear on the last trace of purple. Should the copper solution show signs of decomposition on boiling, before the addition of the saccharine solution, it is unfit for estimations. Too much yellow tint in the supernatant, after the experiment, means too much saccharine solution was added. The supernatant portion in the test tube should be as limpid as water. The constant dividend for a centim of Fehling's solution is half (·5), and the divisor is the centims required to decolourise, and the quotient is the percentage of glucose, *e.g.* Remember any dilution made and allow for same.

Centims decolourising.			*Glucose per cent.*
·5	...	...	1·0
·6	...	...	·83
·7	...	...	·71
·8	...	...	·65
·9	...	...	·55
1·0	...	...	·5
2·0	...	...	·25
3·0	...	...	·16
4·0	...	...	·12

It is clearly seen by this table that the small quantity of sugar contained in a filtrate obtained from a mixture of flour in water (one in ten or twenty), amounting in some cases to only ·04 per cent. in a decimal mixture of flour and water, could scarcely be estimated by a centim of Fehling's solution. Hence for such weak solutions of saccharines, such as one in twenty flour filtrates, the next quantitative test is of the greatest use and of great simplicity.

(*b*) A solution of glucose or maltose in water has no immediate reaction upon the cold subnorme of permanganate, but if lightly caramelised in a definite way by boiling one minute only from the commencement of boiling with one-tenth its volume of liquor potassæ, *i.e.*, solution of potash of the pharmacopœia strength, the cooled caramelised solution reacts on the cold subnorme, and affords a most accurate quantitative test for glucose and maltose.

For Example. One gram of flour is triturated with a little water in a mortar for 2 minutes, and more water added to afford 20 centims of mixture. This mixture is poured upon a paper filter, and we shall obtain about 16 centims of filtrate. Suppose we find 8·8 centims decolourise the subnorme=·079 per cent.

soluble albumen in the filtrate. Caramelise: 1 centim of liquor potassæ and 9 centims of the filtrate, boil one minute from the commencement of boiling and cool. Of this caramelised solution 6·6 centims decolourise the subnorme=·106 per cent. of albumen. Difference ·027 per cent. maltose, or ·54 per cent. in the flour. The constant dividend for *maltose*, caramelised, is practically the same as that for *albumen*, hence there are only these two simple experiments required to obtain the percentages of *soluble albumen* and *maltose* in any given sample of flour or meal. All yellowish-brown colours can be accurately matched and recorded by means of the acid permanganate run into 5 centims of three per thousand solution of iodide of potassium, *e.g.*, 1 centim of acid permanganate affords colour *one*, 2 centims of acid permanganate colour *two*, but even tenths are noted. So a caramelised sugar solution which gives say colour *two* means ·2 per cent. glucose, etc.

Estimation of Fat in Milk.—The albuminoids are estimated by the permanganate subnorme, and the lactose or sugar by the sugar tests.

For example: 1 centim of milk, diluted to 5 centims with water, of this mixture 1·2 centim decolourises subnorme or 1·2 milk the norme. This reaction is due to albuminoids, and is neither due to sugar nor fat.

Fat.—Pour 5 centims of the well-shaken milk into a graduated test tube, add 10 centims of the ether mixture and shake the tube well. Place the tube in a cup of hot water (110° Fahr.) for a quarter of an hour, and read off the floating fat at a temperature of about 70° Fahr. The oily layer should measure half a centim.

The usual quantities are 10 centims of milk, 20 centims of ether mixture, and a Marchand's tube. The factor for 10 centims of milk is 2·33, plus about 1 per cent. for fat in solution, *i.e.* vol. × 2·3 + 1·2 per cent.

THE ETHER MIXTURE.

Solution of Ammonia	1 centim.
*Rectified Spirit (90 vol.)	50 centims.
*Ether (·720)	50 centims.

Diastasic Estimations.—Malt extracts are not expected to have a diastasic value higher than malt itself. Unless samples are brought forward with special claims at a special price, etc.,

*Methylated Spirit and Ether of required strength are sufficient.

they should be considered to have only a *malt* value. Taka Diastase serves as a comparative standard of diastasic value. Make a 1 per cent. solution, the subnorme informs us that it is nearly a $\frac{1}{4}$ per cent. solution of albuminoid equivalent. Hence to estimate the presumed diastasic value of a cereal, a decimal solution must be made of that cereal as in the estimation of sugar.

We can always tell the *prima facie* claim by the percentage of albuminoids ascertained by the permanganate subnorme.

For Example.—1 gram of bread triturated in a small mortar with four centims of the diastasic solution or filtrate until the bread becomes a paste, say two minutes, make the mixture up with more diastasic filtrate to 20 centims. Transfer to a test tube and heat the mixture gently to 145° Fahr., remove the source of heat, let it stand 10 minutes, dilute with water and estimate the glucose or maltose.

Multiplication by 20 makes the percentage referable to the bread, suppose the standard, a 1 per cent. solution or mixture of taka-diastase, had been used, then we should obtain 25 per cent. of glucose, or 25 units of diastasic value, *i e.*, 25 per cent. of the bread was converted into sugar, or 23 deducting 2 per cent. for the sugar already in the bread. Presumably an *absolute* diastasic albumose would afford 100 units of diastasic value.

It is not necessary to ascertain the standard, it may be accepted as experimentally true. The dilution of a cereal or malt must be remembered, and the percentage or units referred to the malt or cereal itself.

A.

Absorption (*absorbea*). This term denotes the passage of a gas or vapour into a liquid or solid substance, or that of a liquid into the pores of a solid. Thus water absorbs carbonic acid gas, lime absorbs water, etc.

Abstract. Separate; withdrawn from connected objects; not concrete; pure; abstruse. Abstract idea, the idea of some quality as distinct from the object in which it inheres, as whiteness. Abstract term, one expressing an abstract idea.

Acetate. A salt formed by acetic acid united with a base.

Acetum (*acer*, sour). Vinegar. The varieties of vinegar known in commerce are: *wine* vinegar, *malt vinegar*, and *sugar* vinegar. The strongest malt vinegar is termed *proof* vinegar, and is called by the manufacturer No. 24; it is estimated to contain 4·73 per cent. of real acetic acid. These vinegars are formed by fermentation.

Acidum aceticum. The sour principle which exists in vinegar. It occurs, ready formed, in several products of the vegetable kingdom, and is generated during the spontaneous fermentation of many vegetable and animal juices. By *real* acetic acid is meant such an acid as occurs in a dry acetate; it cannot exist in an uncombined state.

Acetal. A compound of aldehyde with ether; formed by the action of platinum black on the vapour of alcohol with the presence of oxygen. It is a colourless, very fluid liquid, having a peculiar odour, suggesting that of Hungary wines.

Acetas. An acetate; a salt formed by the union of acetic acid with an alkaline, earthy, or metallic base.

Acetone. The new chemical name for *pyro-acetic spirit*; a limpid, colourless liquid, prepared by distilling a mixture of two parts of crystallized acetate of lead and one part of quicklime in a salt-glaze jar. It is highly inflammable, and burns with a white flame.

Acetyl. A hypothetical radical, produced by the abstraction of two atoms of oxygen from ethyl, by oxidating processes. It pervades a series of compounds, including acetic acid, from which it derives its name.

Achromatic.—Destitute of colour; a term applied to telescopes having lenses so arranged as to avoid being coloured; also to microscopic powers.

Acid. A compound which is capable of uniting in definite proportions with alkaline bases, and which, when liquid or in a state of solution, has either a sour taste, or reddens blue litmus paper.

Aerial. Belonging to the air.

Aeri-form (*forma*, likeness). Air-like; a term applied to *gaseous* fluids, from the resemblance to common air.

Aerolite (a stone). Air-stone; meteoric stone; a mineral substance which falls through the air.

Aerostatics. The science that treats of the equilibrium of air, or elastic fluids, or of bodies supported in them.

Æther (*ether*). A highly volatile and inflammable fluid, produced by the action of acids on alcohol.

Æther sulphuricus rectificaus. L. Rectified ether. This is the ethereal liquid sold under the names of *Ether* and *Sulphuric* or *Vitriolic Ether.*

Æther nitrosus. Nitrous ether, or the *Naptha Nitri.*

Æther sulphuricus. L. Sulphuric or Vitriolic ether, or *Naptha Vitrioli.*

Affinity (*affinitas*, relationship). That kind of attraction by which different bodies combine to form *new* bodies, as in the case of an acid with an alkali, forming a salt. The term was introduced from the idea that chemical attraction takes place between those substances only which resemble each other.

1. *Single affinity* is the power by which two elementary bodies combine.

2. *Elective affinity* denotes the preference which one body manifests in combining with another, rather than with a third, a fourth, &c.

3. *Double elective affinity* occurs when two compounds decompose each other, and two new compounds are formed, by an exchange of elements. This is also called *double decomposition*, or *complex affinity.*

4. *Quiescent affinity* is that which tends to maintain the elements of a compound in their present state, preventing decomposition.

5. *Divellent affinity* is that which tends to arrange the particles of a compound in a new form, producing decomposition. In mixing different compounds, if the sum total of the *divellent* be more powerful than that of the *quiescent* affinities, decomposition takes place.

6. *Disposing affinity* is that which promotes the tendency of the bodies to combine in a particular way, by presenting to them a third substance which exerts a strong attraction to the compound

they form; when the combination has been effected, the third substance may be withdrawn, or *reciprocal affinity*; *elementary*, when it takes place between the elementary parts of bodies; and *resulting*, when it is a compound only, and would not take place with the elements of that compound.

Air (aër). In popular language, this term denotes the *atmosphere*, or the gaseous fluid which surrounds the earth. It consists, *when pure*, of 20 oxygen and 79 nitrogen: it contains however, carbonic acid, varying from 3 to 8 parts in 10,000 by weight. The term is also generally used to denote *gas*, or a permanently elastic or *aeriform* fluid.

Albumen (*albus*, white). Albumen is of two kinds, animal and vegetable. The main solid constituent of the white of egg gives its name to the whole group. The blood of many animals contains it, and also most of the vegetable juices, and it is found in certain seeds. It exists in two forms, soluble and insoluble; 100 parts of pure dry albumen contain carbon 53·5, hydrogen 7·0, nitrogen 15·5, sulphur 1·6, oxygen 22·4.

Alcohol (an alchemical term for the essence of bodies, separated by sublimation from the impure particles). Ardent spirit of wine. A term applied to the pure spirit obtained by distillation from all liquids that have undergone vinous fermentation. When diluted with an equal weight of water, it is termed *Proof Spirit*, or *Spiritus tenuior* of the Pharmacopœia. The first product of distillation is technically called *low wine*, and is again subjected to distillation. The latter portion of what comes over are called *feints*, and are reserved for a further process in the wash-still. The second product is termed *raw spirit*, and when again distilled is called *rectified spirit*. The strongest alcohol which can be procured is termed *absolute alcohol*, to denote its entire freedom from water.

Aldehyde. A colourless liquid, one of the products of the oxidation of alcohol. Its name is derived from the first syllables of the words *al*cohol and *dehyd*rogenatus. Aldehyde is, in fact, alcohol *minus* hydrogen.

Alkali (Arab. *al*, the, *kali*, the name of a particular plant, and an old name for Potash). A substance which unites with acid in definite proportions, and changes vegetable blues to green. It is of three kinds:—1. The *Vegetable*, or Potash—2. The *Mineral*, or Soda, or *fixed* alkalies, being *left* in the ashes of inland and marine plants respectively. 3. The *Animal*, or Ammonia, or *volatile* alkali, being *raised* by distillation from hartshorn, &c.

Al-ka-loid. A vegetable principle having alkaline qualities.

Alumen. Alum; a double, or sometimes a triple salt, consisting of sulphuric acid and alumina, with potash or ammonia, or frequently both of them.

Alumina. *Aluminous earth.* One of the primitive earths, which from constituting the plastic principle of all clays, loams, and boles, was called *argil* or *argillaceous earth;* but now, as as being obtained in its greatest purity from alum, is called *alumina*, or the sesqui-oxide of aluminium.

Ammonia. *Ammoniacal Gas.* A transparent, colourless, pungent gas, formed by the union of nitrogen and hydrogen. It is frequently termed the *volatile alkali*, to distinguish it from the *fixed* alkalies, soda and potash. Its present name is derived from *sal ammoniac*, of which it constitutes the basis, and which received its title from being first prepared in the district of Ammonia in Libya.

Ammonium. A term applied to a hypothetical compound of nitrogen and hydrogen.

Amids. Digested nitrogenous matter.

Analysis (to solve). Separation of a body, into its elements, or component parts. Every distinct compound, which exists ready formed, is called a *proximate* or *immediate principle*, and the process of procuring it is termed *proximate analysis*. The reduction of the proximate principles into their simplest parts constitutes *ultimate analysis*.

Angelica Archangelica. Garden Angelica; a plant of the order *Umbelliferæ*.

Candied Angelica is made from the fresh stalks of this plant, boiled in syrup; an agreeable sweetmeat.

Anhydrous (priv., water). Without water; a term applied to crystals and gases which are deprived of water. Compare *Hydrates*.

Aniline. An oily liquid, which distils over when finely-pulverised indigo is decomposed by a highly-concentrated solution of caustic potash or soda, in a retort.

Animalcula. Microbes. Organisms.

Annealing, or Nealing. The process of cooling a heated body in a moderate temperature. If cooled too suddenly, it becomes extremely brittle.

The *Annealing of Glass* is conducted in the same manner, and is necessary to prevent its flying to pieces on the application of violence or a high temperature.

Aqua Fortis. A name applied by the alchemists to the nitric acid of the Pharmacopœia, on account of its strong solvent

and corrosive properties. It is distinguished by the terms *double* and *single*, the latter being only half the strength of the former. The more concentrated acid, which is much stronger even than the double aqua fortis, is termed *spirit of nitre.*

Aqueous (*aqua*, water). A term in general use for designating definite combinations with water. The term *hydrate* has long been employed for the same purpose. A prefix is used when there is more than one atom, as in *bin*-aqueous, *ter*-hydrate.

Assaying. The chemical operation of ascertaining the quantity of any metal in an ore or mixture. It differs from analysis only in degree; and is performed in the dry way, as by heat; in the moist way, as by acids, and other re-agents; or by both methods.

Assimilation. The conversion of the food into nutriment.

Astringents. To bind and contract.

Atmosphere (vapour, a sphere). That volume of air which surrounds the earth.

1. *Atmospheric Pressure* is indicated by the length of a column of mercury. A mercurial column, 30 inches in length, presses on a given surface with the same force as the atmosphere in its ordinary state; and hence the force of a 60-inch column is equal to the pressure of *two atmospheres*; that of 15 inches to half an atmosphere; that of one inch to 1-30th of the atmospheric pressure.

2. *Atmospheres—two*, *three*, &c. Multiplied pressures of air, arising from condensation, the ordinary pressure being about fifteen (14·7 lbs.) pounds on the square inch.

Atom (priv., to cut). An ultimate particle of matter, incapable of further division.

Atomic Theory. A theory introduced for explaining the laws of definite proportions in chemical combinations. It is founded on the supposition that matter consists of ultimate indivisible particles, called *atoms;* that these are of the same size and shape in the same body, but differ in *weight* in different bodies; and that bodies combine in definite proportions, with reference to those weights, which are hence called *atomic weights.* The main features of this theory are briefly:—

1. In bodies capable of assuming tbe gaseous form, the weight of the atom is obtained from the *volume;* thus, water being composed of one volume of oxygen, united with *two* volumes (or *one atom*) of hydrogen, the relative weights will be, oxygen 8, hydrogen 1, and water 9.

2. In bodies which do not assume the gaseous form in their simple state, the weight of the atom is deduced from that of the *compound;* the weight of carbon, for instance, is obtained from that of carbonic acid gas, one volume of which weighs 22 times as much as our standard of unity; of these 22 parts, 16 are oxygen, leaving 6 to represent the primary molecule of carbon.

3. In the case of bodies which are incapable of assuming a gaseous form, either alone or in combination, the weight must be obtained by *analysis;* thus, marble, or the carbonate of lime, is found to be composed of 22 parts of carbonic acid, and 28 of lime: 28 therefore represents the atomic weight of lime.

4. The atomic weights are generally supposed to be related to one another by *multiple;* hence, this is often called the *law of multiples*, or of combinations in *multiple proportion.* This will be easily seen by referring to the component parts of the following substances:

	Nitrogen.	Oxygen.
Nitrous oxide	14	8
Nitric oxide	14	16
Hyponitrous acid	14	24
Nitrous acid	14	32
Nitric acid	14	40

See *Books on Chemistry*.

Attemperator. A vessel for measuring the quantity and heat of water; a tank fitted with hot and cold water, a thermometer showing outside the temperature of the water inside. There is also an indicator marked off in quarts and gallons, showing the quantity run in or out. A very useful tank to the baker, enabling him to mix water of different temperatures together, so that one part qualifies the other by combination, until he has the quantity and temperature he requires.

Attenuation (*attenuo*, to make thin). The lessening of weight, or of consistency; emaciation. The term is applied to the process by which a fluid becomes of less specific gravity, as when it undergoes fermentation, and parts with carbonic acid.

Capillary Attraction. The power by which a liquid rises in a fine tube higher than the surface of the liquid which surrounds it.

Electrical Attraction. The property displayed by certain substances of attracting certain others, on being rubbed.

Magnetic Attraction. The tendency of certain bodies, chiefly iron, towards the north pole of the earth and each other.

Attraction of Cohesion. The tendency of the *molecules* of a body to cohere, to form masses.

Attraction of Affinity. The tendency of the *atoms* of certain bodies to combine, to form *chemical compounds.* See *affinity.*

B

Barometer (weight, a measure). A weather-glass or instrument for measuring the varying pressure of the atmosphere.

Base. In Chemistry a body which undergoes a chemical change by the action of another body.

Bath, Chemical. An apparatus for modifying and regulating the heat in various chemical processes, by interposing a quantity of sand, or other substance, between the fire and the vessel intended to be heated.

Water Bath. Any vessel containing water, capable of being heated to the boiling point, and of containing a retort or beaker.

Sand Bath. An iron vessel containing sand, being gradually heated, communicates the heat to every vessel buried in the sand. Those distillations which, at any part of the process, require as much as a low red heat, are usually performed in sand baths.

Solution Bath. Where temperatures above 212 degs. are required for baths, saturated solutions are employed; these, boiling at different temperatures, communicate heat up to their boiling points. Solution baths will produce temperatures up to 360 degs.

Beaker. A glass vessel very thin and uniform in substance, and made of well-annealed glass, used for effecting solutions and withstanding the action of heat.

Body. Any determinate part of matter. Its forms are the *solid*, as crystals; and the *fluid*, which are *elastic* and aëriform, as gases; or *inelastic* and liquid, as water.

Boiling Point. That degree in the scale of the thermometer, at which *ebullition* is produced under the medium pressure of the atmosphere. Thus, 212 degs. is the boiling point of water, when the barometer stands at 30 inches; at 31 inches, it is 213·76; at 29, it is only 210·19; in a common vacuum, it is 70 degs.

Brimstone. A name for sulphur. The sublimed sulphur of the Pharmacopœia is termed *flowers of brimstone*, or of sulphur.

Brunonian Theory. A theory founded by John Brown, according to which no change can take place in the state of the excitable powers without previous excitement; and it is only by over-excitement that the excitability, with life, can be exhausted.

C

Calcination (calx, lime). A term formerly applied to express the oxidation of a metal effected by the action of the air: the

oxide thus formed was denominated a calx, from its being earthy like lime. The term is now generally applied whenever any solid matter has been subjected to heat, so as to be convertible into a state of powder.

Calcium. The metallic base of lime.

Capillary (*capillus*, a hair). Resembling a hair in size; a term appled to—

The *Attraction* by which a liquid rises in a capillary tube higher than the surface of that which surrounds it.

Caramel. The name given to the porous shining mass produced by heating sugar to a high temperature (about 325 degs).

Carbohydrate is a name given to a class of bodies composed of carbon, hydrogen, and oxygen, in which there are two atoms of hydrogen for every one of oxygen.

Carbon (*carbo*, a coal). A substance well known under the form of coal, charcoal, lamp-black, etc. In chemical language, it denotes the pure inflammable principle of charcoal; in its state of absolute purity, it constitutes the *diamond*.

Carbon, animal. Animal charcoal, bone charcoal, and ivory-black, are names applied to bones calcined, or converted into charcoal, in a close vessel. Animal charcoal is also prepared by calcining dried blood, horns, hoofs, clippings of hides, etc., in contact with carbonate of potash, and washing the calcined mass afterwards with water.

Carbon, mineral. A term applied to charcoal, with various proportions of earth and iron, without bitumen. It has a silky lustre, and the fibrous texture of wood. It occurs stratified with various kinds of coal.

Carbonic acid. $C.O._2$ A pungent and acidulous gas, produced by the combustion of carbonic oxide, or by that of charcoal in oxygen gas. This gas was termed *fixed air*, from its having been found to exist, in a fixed state, in limestone, and the mild alkalies, from which it was expelled by heat and the action of acids.

Carbonates. Compounds of carbonic acids with the salifiable bases. They are composed either of one atom of acid and one of the base, or of two of acid and one of the base; the former are called *carbonates*, the latter *bi-carbonates*.

Carbolic acid. One of the particular products which have been isolated in the distillation of coal.

Caustic (to burn). A substance which destroys parts by chemically decomposing them. Such are the concentrated mineral acids, lunar caustic, etc.

Cerealin is a diastasic principle of bran and germ.

Chemistry. A term, of Arabic origin, signifying the knowedge of the composition of bodies, and of the changes of contitution produced by their mutual action on each other.

Chloral. This term, derived from the first syllable of the words *chlor*ine and *al*cohol, has been applied to a new compound of chlorine, carbon, and oxygen, prepared by the mutual action of alcohol and chlorine.

Chyle (juice). The milk-like fluid absorbed by the lacteal vessels.

Chyme (juice). The semi-fluid matter which passes from the stomach into the duodenum.

Citric acid. An acid of lemons. It is decomposed by exposure to heat, and a new acid sublimes, called the pyrocitric.

Clarification (*clarus*, clear, *fio*, to become). The process of clearing liquids. It is performed by—

1. *Subsidence* of the suspended particles and decantation of the supernatant liquor.
2. *Filtration*, or straining through filters of paper, linen, sand, charcoal, etc.
3. *Coagulation*, or the admixture of albumen, or the white of an egg, and the subsequent action of heat, acids, etc.

Coagulation (*con* and *agere*, to bring together). A term formerly synonymous with crystallization, but now applied to the partial solidification of a fluid body by exposure to extreme temperatures, or by the addition of some agent.

Cohesion (*cohæreo*, to stick together). The power by which the component particles of a body *cohere*, or are kept together. It is the opposite to *expansion*.

Cold. As heat exists in all bodies, the term *cold* has only a negative sense, implying a greater or less privation of heat.

Combination (*cum*, with; *binus*, two). The union of the particles of different substances, by chemical attraction, in forming new compounds.

Combustion (*comburo*, to burn). Burning; the disengagement of heat and light which accompanies rapid chemical combination.

Combustion-heat. Animal heat produced by combination of the oxygen derived from the air with the carbon and hydrogen of alimentary substances.

Combustion spontaneous. This is said to occur in the human body; and it does occur when masses of vegetables, as damp hay, or oily cotton, are heaped together.

Comminuted. To break in pieces. A term applied to any substance which has been ground into minute particles.

Compotes. Fruits preserved with sugar; generally made up into ornamental dishes of sweets, served at dinner.

Compounds.—The following terms are employed in designating compounds :—

1. *Binary, ternary, quaternary.* These terms refer to the number of *elements* or proximate principles—two, three, or four—which exist in a compound. The *binary* compounds of oxygen, chlorine, iodine, bromine, and fluorine, which are not acid, terminate in *ide*, as oxide, chloride, etc.; those of all other substances terminate in *uret*, as hydruret of carbon, sulphuret of iron, etc.

2. *Bis, ter, quater.* These are Latin numerals, indicating the number of *atoms* of acid, which are combined with one of the base in a compound, as *bi*-sulphate of soda, etc.

3. *Dis, tris, tetrakis.* These are Greek numerals, indicating the number of *atoms* of base which are combined with one of the acid in a compound, as *di*-chromate of lead, etc. No prefix is used when the compound consists of one atom of each ingredient. But there are many exceptions to these rules: protoxide and deutoxide are frequently used for oxide and binoxide respectively.

Condensation (*condenso*, to make thick). The act of diminishing the bulk of a body, as by the conversion of steam into water, gases into fluids, fluids into solids, etc.

Condenser. 1. A vessel in which steam is converted into water, by the application of cold. 2. An instrument employed in electrical experiments on the same principle as the electrophorus, the purpose of which is to collect a weak electricity, spread over a large surface, into a body of small dimensions, in which its intensity will be proportionably increased, and therefore become capable of being examined.

Constituent. Essential, elemental, constituting, composing.

Convex. Rising to a roundish form on the outside; spherical; the opposite of concave.

Corrosives (*corrodo*, to eat away). Substances which have the power of wearing away or consuming bodies, as caustics, escharotics, etc.

Crystallization (ice). The process by which the particles of liquid or gaseous bodies form themselves into *crystals*, or solid bodies of a regularly limited form.

Curcuma Paper. Paper stained with a decoction of *tumeric*, and employed by chemists as a test of free alkali, by the action of which it receives a brown stain.

Cystis (a bladder). By this term is meant a membrane, forming a sort of shut sac, and containing a liquid or half-liquid matter secreted by the membrane which encloses it.

D

Decantation. The pouring off of clear fluid from sediments.

Decimal. Numbered by tens; increasing or diminishing by tens. See *Metric System*.

Decomposition. The separation of the component parts or principles of bodies from each other.

Decortication (*de*, from; *cortex*, bark). The removal or stripping off of the bark, husk, etc.

Density (*densus*, thick). The property of a body, by which a certain quantity of matter is contained under a certain bulk. Opposed to rarity.

Deoxidation (*de*, from, and *oxidation*). The separation of oxygen from a body; the reducing a body from the state of an oxide.

Desiccation (*desicco*, to dry up). The operation of drying; the state of being dry. A desiccator, consisting of a vessel containing some hygroscopic compound such as sulphuric acid, is used in moisture estimations for preventing the dried sample from re-absorbing moisture while being weighed.

Dextrin, $C_6H_{10}O_6$ (*dexter*, right). Mucilaginous starch prepared by boiling a solution of starch with a few drops of sulphuric acid. It then becomes a gummy substance. It is formed also in bread, and is very nutritious. Its name is derived from its property of turning the plane of the polarization of light to the right hand.

Dia. A Greek preposition, denoting *through*. Words compounded with it imply *extension*, *perversion*, *transition*; also that which in English and Latin is expressed by the prefixes *di-* or *dis-*, as in divido, to divide; disjungo, to disjoin.

Diastase. A vegetable principle which appears during the germination of barley and other seeds, and converts their starch into gum and sugar for the nutrition of the embryo. The name is derived from two Greek words meaning to separate, in reference to its property of separating two supposed constituents of starch.

Diastasis (to separate). The act of degrading starch into dextrin and maltose.

Diffusion Volume. A term adopted to express the different disposition of gases to interchange particles; the diffusion-volumn of air being 1, that of hydrogen gas is 3·83

Digester. A vessel of copper or iron, for preventing the loss of heat by evaporation.

Digestion (*digero*, from *diversim gero*, to carry into different parts). A term employed in various senses:—

In *Physiology*, the change of the food into *chyme* by the mouth, stomach, and small intestines; and the absorption and distribution of the more nutritious parts, or the *chyle*, through the system.

In *Chemistry*, the continued action of solvent upon any substance.

Dioxide. According to the electro-chemical theory, the elements of a compound may, in relation to each other, be considered oppositely electric; the equivalents of the *negative* element may then be distinguished by Latin numerals, those of *positive* by Greek; thus a *bin*-oxide denotes a compound which contains two equivalents of the *negative* element oxygen; whereas a *di*-oxide indicates that one equivalent of oxygen is combined with two of some *positive* body. And so of *bi*-chloride, *di*-chloride, &c.

Distillation (*distillo*, to drop by little and little). The vaporisation and subsequent condensation of liquids, by means of a retort, alembic, or still. Dry distillation is performed in the same way as the humid, except that the substance is neither immersed nor dissolved in any menstruum. It is termed *sublimation*.

1. *Distillation destructive*. The subjection of bodies to a red heat in close vessels, and the collection of the products.

2. *Distillatio per latus*, in which the vapour passes *laterally* from the retort to the receiver, where it is condensed.

3. *Distillatio per ascensum*, in which the vapour *ascends* into the head of the still, and thence passes into the worm, before it is condensed.

4. *Distillatio per descensum*, in which the vapour *descends* into a lower cavity of the vessel to be condensed, fire being placed over the materials.

The distiller allows fermentation to proceed until the whole of the saccharine in the liquid is turned into alcohol, the carbonic acid also passing way. When fermentation has stopped, the wort is removed to the wash charger, and thence to the still—a copper boiler with a closed head—to which is attached a copper pipe called the worm, descending through a large tub filled with cold water in constant circulation. Fire and steam applied to the still cause the contents to boil, the vapour arising therefrom passing through the worm, and is, consequently, condensed, issuing from the end of the worm as a liquid, called in distillery "Low wines." This is redistilled and reduced to spirit.

Drachm. A Grecian silver coin worth about eighteen cents. A Grecian weight of about 2 dwt. 7 grains troy; usually written here drachma.

Dram. In medicine the eighth of an ounce, in avoirdupois weight the sixteenth of an ounce.

Ductility (*duco*, to draw). That property of bodies by which they admit of being drawn out into wire or string.

Dynamics. That branch of mechanics which treats of the force of moving bodies.

E

Ebullition (*ebullio*, to bubble up). The boiling or bubbling of liquids; the production of vapour at the *boiling* point.

Elecampane (contracted from *enula campana*). The Inula Helenium, a plant of the order *Compositæ*, the root of which yields a white starchy powder called *inuline*; a sweetmeat.

Element. This term denotes, in Chemistry, a single substance—one not *known* to contain more than one kind of matter, as the metal iron. The rust of iron, on the other hand, is a *compound*, being resolvable into metallic iron, oxygen, and carbonic acid.

Ultimate Element. The last element into which a body can be decomposed or analyzed (see "Chemistry Text Book" for list of the names).

Embryo. The rudiments of an animal or plant, not distinctly formed; pertaining to anything in its first rudiments. The germ of a grain as opposed to the endosperm on which it feeds.

Empirical. Used and applied without science; as applied to philosophy, that of experiment or facts in opposition to merely hypothetic or theoretic.

Endo (within). A Greek preposition, signifying *within.*

Endo-carp (fruit). The innermost portion of pericarp. In some fruits it presents a bony consistence, as in the peach, and has been termed *putamen.*

Endosmosis (within, impulsion). The property by which rarer fluids pass through membranous substances into a cavity or space containing a denser fluid.

Epi. A Greek proposition denoting *upon.*

7. *Epi-carp* (fruit). The exterior portion of the pericarp, commonly termed the skin of fruits.

Equilibrium (*æquè*, equally; *libro*, to balance). A term expressive of the equality of temperature, which all bodies on the earth are constantly tending to attain—and of the equal distribution of the electric fluid in its natural undisturbed state.

Equivalents (*æquè* equally; *valeo*, to avail). A term applied to the *combining proportions* of elementary and compound substances, as the quantities of acid and base in salts, required to neutralize each other. See "Text Book" for instances of this law.

Ergota. *Secale Cornutum.* Spurred rye; a long black substance, like a horn or spur, formed on rye, and many other of the *gramina*, and supposed to be produced by a parasitic fungus.

1. *Ergotætia ergota.* The generic name given to the ergot fungus, to which was added the specific appellation of *abortifaciens*, in allusion to its destroying the germinating power of the grain of grasses.

Esculent. An appellation given to those plants, or any part of them, which may be eaten for food.

Essential Oils. Oils obtained by distillation from odoriferious vegetable substances.

Ether (ether). A liquid produced by a remarkable decomposition of alcohol, by sulphuric, phosphoric, and arsenic acids. It is sometimes distinguished as *sulphuric ether*, from the mode of preparing it.

Eugenia Pimenta. The common Allspice; a Myrtaceous plant, the fruit of which constitutes Pimento, or Jamaica pepper, commonly called allspice, from its flavour approaching that of cinnamon, cloves, and nutmegs.

Evaporation. The production af vapour at common or moderate temperatures.

Spontaneous Evaporation. The production of vapour by some natural agency, without the direct application of heat, as on the surface of the earth or ocean.

Expansion (*expando*, to spread out). An enlargement of volume; the usual effect of heat.

Expiration (*expiro*, to breathe). That part of respiration in which the air is expelled.

Expressed Oils. Oils obtained from bodies by pressure.

F

Farina (*far*, *farris*, corn). Meal or vegetable flour, made from the seed of the *Triticum Hybernum*, the cerealia, legumes, etc.

Fecula (*fæx*, the grounds or settlement of any liquor). Originally, *any* substance derived by spontaneous subsidence from a liquid; the term was afterwards applied to *starch*, which was thus deposited by agitating the flour of wheat in water; and, lastly, it denoted a peculiar vegetable principle, which, like starch,

is insoluble in cold, but completely soluble in boiling water, with which it forms a gelatinous solution.

Fibre. A filament or thread of animal, vegetable, or mineral composition. Woody fibre or lignine; the fibrous structure of vegetable substances; cellulose.

Fibril. A small filament, or fibre, as the ultimate division of a nerve. The term is derived from fabrilla, dim. of *fibra*, a filament.

Fibrin. A tough fibrous mass, which, together with albumen, forms the basis of muscle. The gluten of flour contains 71 per cent. fibrin.

Filament (*filum*, a thread). A small thread-like structure, or fibre, as that of a nerve, etc.

Filtration (*filtrum*, a strainer). The act of straining fluids through paper, linen, sand, etc. The strainers are termed *filters*.

Fusion (*fusus*, melted, from *fundo*, to pour out). The state of melting. Substances which admit of being fused are termed *fusible*, but those which resist the action of fire are termed *refractory*. Fusion differs from liquefaction in being applied chiefly to metals and other substances which melt at high temperature.

G

Gaseous. Being in the form of gas; aëriform.

Germ. A seed bud; first principle; origin. The only portion of a wheat grain containing life, and from which the root is projected; is about 2 per cent. of the grain, and eradicated by roller millers because of the soluble albuminoids it contains, and because also of its fat.

Germinate. To bud; to sprout.

Glutinous. Viscous; viscid; tenacious.

Granular. Consisting of grains, or resembling grains.

H

Heat. *What is heat?* There are two theories of what heat is: **The Material and the Dynamical.** The material theory says that heat is a kind of matter, *a subtle fluid stored up in the interatomic spaces of bodies.* The dynamical theory, or as it is sometimes called the mechanical theory, is more modern, and for that reason is accepted now as being the most correct, it having had the latest thought on heat, and the knowledge of all subjects becomes more exact, and is evolved as time goes on when

it receives the concentrated thought of research. This modern dynamical theory says that heat is not matter, but only a condition of matter and a motion of its ultimate particles—that heat is a brisk agitation of the insensible parts of the object which produces in us that sensation, from whence we denominate the object hot. So that what in our sensation is heat, in the object is nothing but motion.

All heat is of the same kind, whether produced by burning of fuel, or by mechanical means (friction or force applied to a body), or by the change of state in the passage of a less stable body to a more stable arrangement of atoms, whether the change is produced by a chemical combination or decomposition. Molecular changes are nearly always attended with evolution or absorption of heat. But though all heat is of the same kind it is not always of the same quantity. (A half-sovereign is gold, but there is not so much gold in it as in a sovereign).

This brings the subject to the difference there is between the thermal state of a body and the quantity of heat there is in it. Take as an example 1 lb. of water at 100° c, and 2 lbs. at the same temperature. It must be obvious to you that though both are the same in temperature, there must be a larger quantity of heat in the 2 lbs. than in the 1 lb. Very briefly I will explain this. The temperature of a body is a measure of the degree of its heat. This is the work of the thermometer. *The measure of the quantity of heat in a substance is the number* OF HEAT UNITS *there are in it*, what I do mean by units of heat, all measurements of the quantity of anything must have a standard unit to start from. The standard unit in the measurement of the quantity of heat is the quantity of heat necessary to raise 1 gram of water 1 degree from 0° c. to 1° c. To see how much heat, therefore, there is in the 1 lb. of water it is only necessary to find out how many grams it contains—which is 373. The heat of this lb. of water was 100° and therefore this 373 must be multiplied by 100, viz., 37,300 heat units are in it, and of course double that number in the double quantity of 2 lbs. at the same degree of heat. The weight of water in grams, multiplied by the number of the degrees of temperature through which it is raised equals the number of H. U. (heat units) in it.

Hot and Cold are terms generally used, but they are merely different degrees of the same thing—*Heat.*

Sensible or free Heat is that which produces the sensation of heat, or affects the thermometer.

Latent Heat is that portion which passes into bodies during a change of form, without elevating their temperature; as into ice

at 32°, as it becomes water, and termed *Heat of fluidity*; or into water at 212°, as it passes into vapour, and termed *Heat of vaporisation*. The latent heat of water is 80°°, of steam 540°°.

Specific Heat is the (unequal) quantity of heat required by similar quantities of *different* bodies to heat them equally. The specific heat of water is 23 times as great as that of mercury; thus, if equal weights of the former at 40°, and of the latter at 160°, be mixed together, the resulting temperature is 45°. This quality of bodies is called their *capacity* for heat.

Absolute Heat denotes the total amount of heat in bodies.

Evolution of Heat denotes that which is set free on a change of capacities in bodies, from greater to less, as in combustion, on mixing water with sulphuric acid, or alcohol, &c.

Absorption of Heat, the reverse of the former, as in the melting of ice, the evaporation of water, or other fluids, &c.

Diffusion of Heat denotes the modes by which its *equilibrium* is effected, viz., by conduction, radiation, and convection:—

Conduction of Heat. Its conduction along the molecules of a body, or its passage through bodies; those which allow it a free passage through their substance, as metals, are termed good con ductors; those of a different quality, bad conductors.

Radiation of Heat, or its emission from the surface of all bodies equally in all directions, in the form of radii—or rays; these, on falling upon other bodies, are either reflected, absorbed, or transmitted.

Convection, or the conveying of Heat, as when a portion of air, passing through and near a fire has become heated, and *conveys* the temperature acquired from the fire by means of currents. The convection of heat, philosophically considered, is in reality a modification of the conduction of heat; while the latter may be viewed as an extreme case of radiation.

Hermetic Seal (Mercury). The closing of the end of a glass vessel when heated to the melting point. The name is derived from the Egyptian Hermes, supposed to have been the father of Chemistry, which has been called the *Hermetic Art.*

Hilum. The point of the seed by which it is attached to the placenta. This is the *base* of the seed.

Homogeneous (like, kind). The term denotes substances made up of parts possessing the same properties. *Heterogeneous*, on the contrary, denotes that the parts are of different qualities: thus, in minerals, sandstone is a *homogeneous*, and granite a *heterogeneous*, body.

Hydr, Hydro (water). A prefix generally denoting the presence of *water* in definite proportions; but owing to the changes of nomenclature, it sometimes denotes the presence of *hydrogen* in certain chemical compounds.

Hydr-acids. Hydro-acids; a class of acid compounds into which *hydrogen* enters as the acidifying principle; as the hydro-chloric, the hydro-cyanic, etc.

Hydr-argyrum (water, silver; so called from its fluidity and colour). Formerly, Argentum vivum. Mercury, or quicksilver.

Hydr-ates. Chemical compounds of solid bodies and water, still retaining the solid form, as sulphur, soap, etc. These are also termed *hydroxures*, and *hydro-oxidez.* When there is more than one atom of water, prefixes are employed, as *bin-aqueous*, *ter-hydrate*, etc.

Hydro-chloric acid. An acid consisting of hydrogen and chlorine, and long known under the name of spirit of salt, marine acid, and muriatic acid.

Hydrocyanic acid. An acid consisting of hydrogen and cyanogen, and commonly called prussic acid. The hydro cyanic acid of Scheele contains five per cent. by weight of real acid; that of the Pharmacopœia contains about two-fifths of the above weight.

Hydrogen (to produce). A gas formerly termed inflammable air, phlogiston, or phlogisticated air: its present name refers to its forming *water*, when oxidated.

Hydro-meter (a measure). An instrument for measuring the gravity of fluids. When floating in liquid, it rises in proportion as the density of the liquid increases; it is graduated from 1·000 to 1·060, so as to exhibit at once the specific gravity.

Hydrous. Watery; containing water in its composition.

Hyper (over or above). This prefix is a Greek proposition, denoting *excess.* In Chemistry, it is applied to acids which contain *more* oxygen than those to which the word *per* is prefixed.

Hypo. A Greek proposition signifying *under*, or deficiency. In chemistry, it denotes a smaller quantity of acid than is found in the compounds to which it is prefixed, as in hypo-sulphuric acid, etc.

Ice. *Glacies.* Solidified water. The temperature at which it is solidified is called the *freezing* or *congealing point*, or 32° of Fahrenheit. During liquefaction, its temperature is not changed; and, hence, the heat which it has absorbed is said to have become *latent.*

Immiscible. Incapable of being mixed.

Incineration (*incinero*, to reduce to ashes, from *cinis*, a cinder). The reducing to ashes by burning. The combustion of vegetable or animal substances for the purpose of obtaining their ashes or fixed residue.

Induction. That law by which an electrified body *induces* in contiguous substances an electric state opposite to its own.

Infusion (*infundo*, to pour in). The operation of pouring water, hot or cold, on vegetable substances, for the purpose of extracting their soluble and aromatic principles; also signifies the solution thus obtained.

Insolubility (*in*, not; *solvo*, to loose). A property, resulting from cohesion, by which a substance resists solution.

Inspiration (*inspiro*, to inhale). That part of respiration in which the air is inhaled.

Integral Particles (*integer*, entire). The most minute particles into which any substance, simple or compound, can be divided, *similar* to each other, and to the substance of which they are parts. Thus, the smallest portion of powdered marble is still marble; but if, by chemical means, the calcium, the carbon, and the oxygen of this marble be separated, we shall have the *elementary* or constituent particles.

Iodine, a crystallized solid substance, found in marine plants; it becomes volatile by a slight increase of temperature, and forms a beautiful *violet* vapour. A solution of iodine detects starch by turning it blue.

Iodides or *iodurets*. The compounds of iodine with metals, and with the simple non-metallic substances.

Isolate. To separate from; detached.

Iso (equal). This prefix denotes *equality*, or *similarity*. Hence,—

1. *Iso-barysm* (weight). Similarity of weight, supposed to be the cause of the identity in the size and shape of molecules which cohere into the crystalline form.

2. *Iso-chromatic* (colour). Having the same colour, as applied to lenses.

3. *Iso-chronous* (time). That which occurs in equal time, as the stroke of the pulse, the vibrations of pendulums of the same length, etc.

4. *Iso-meric compounds.* Noting compounds made up of the same elements in the same proportions, and yet having very different properties, *e.g.*, starch and dextrin.

5. *Iso-morphous bodies* (form). A term applied by Mitscherlich to different bodies which assume the same crystalline form; their relation in form is called *isomorphism*. When the relations are not exact, but nearly so, they may be supposed to give origin to *plesio-morphism* (near), or an approximation to similarity of form.

6. *Iso-thermal* (heat). Of equal degrees of heat, as applied to lines of equal temperature in physical geography. Lines drawn through places having the same summer and the same winter, are denominated *isotheral* (summer) and *iso-cheimal* (winter) lines.

L

Legumen (*lego*, to gather). A legume; a one-celled, two-valved, superior fruit, dehiscent by a suture along its face and its back, and bearing seeds on each margin of its ventral suture.

1. *Legumen lomentaceum*. A lomentum; a fruit differing from a legume in being contracted in the spaces between each seed, and there separating into distinct pieces.

2. *Legumin*. A peculiar principle, found in the fleshy cotyledons of the seeds of papilionaceous plants. Legumin, cereàlin and albumin are the chief soluble albuminoids of flour.

Leguminosæ (*legumen*, a legume). The Pea tribe of Dicotyledonous plants. Herbs with *leaves* alternate; *stamens* perigynous, monadelphous, or diadelphous; *ovarium* superior, solitary, simple; *fruit* leguminous.

Lens (*lens*, *lentis*, Latin, a bean). Properly, a small roundish glass, shaped like a *lentil*, or bean.

1. In *Physics*, the term is applied to any transparent medium, of certain forms: these are, the *convex*, which converges the rays; the *concave*, which disperses them; the *plano-convex*, having one surface plane, and the other convex; the *double convex*, having both sides convex; the *plano-concave*, having one surface plane, the other concave; the *double concave*, having two concave surfaces; and the *meniscus*, having one side concave, and the other convex.

2. In *Anatomy*, the term is applied to the *crystalline humor* of the eye. *Shortsightedness* is occasioned by the convergence of the rays to a point before they fall upon the retina, and a concave lens is employed to delay their convergence; in *longsightedness*, the rays do not converge to a point till they have passed the retina, and the convex lens is employed to promote their convergence.

Light. The agent of vision. It is distinguished into two kinds, viz., *natural* light, proceeding from the sun and stars; and *artificial* light, proceeding from bodies which are strongly heated; this glowing or shining appearance is called *incandescence*. The phenomena of light may be referred to the following heads:—

1. *Radiation*, or the emission of light, like that of heat, in all directions, in the form of *radii*, or rays. A collection of such rays accompanying each other, is termed a *pencil*. The *radiant point* is the point from which diverging rays proceed; the *focus*, the point into which converging rays are collected.

2. *Reflection*, or the rebound of a ray of light, as of heat from a polished surface; the angle of *incidence* being equal to the angle of *reflection*.

3. *Reflection*, or the *break* of a natural course of a ray of light, as it passes into a transparent substance, as glass or water;

this is termed *ordinary refraction.* If a ray fall upon the surface of Iceland spar, or certain other substances, it will be split into two portions, making an angle with each other, and each pursuing its own separate course; this is called *double refraction*; one of these rays following the same rule as if the substance were glass or water, the other undergoing *extraordinary refraction.*

4. *Polarisation*, or the property by which a ray of light, after its emergence from the substance, or reflection from the surface, of a body, acquires *poles* or sides with different properties, in relation to the plane of its incidence. Polarised light may be procured from common light in three ways, viz:—

1. By *reflection* from the surfaces of transparent and opaque bodies.
2. By *transmission* through several plates of uncrystallised bodies.
3. By transmission through bodies regularly crystallised, and possessing the property of double refraction, as Iceland spar, etc.

5. *Decomposition*, or the division of a ray of light, in traversing a prism, into it constituent colours; the appearance thus produced is called the *prismatic spectrum*. See *Prism*.

6. *Phosphorescence*, or the emission of light from certain substances. These are artificial compounds, as Canton's phosphorus; some bodies when strongly heated, as marble, certain marine animals, in the living or dead state, as the medusa, the herring, etc.; certain animalculæ, as the fire-fly of the West Indies, the glow-worm, etc.; vegetable substances, as rotten wood, peat-earth, etc.

Lime. The oxide of calcium; an alkaline earth, found as a carbonate in marble, chalk, and limestone. These substances become lime, when burned in a white heat.

1. *Quick lime.* The name of limestone which has been burned, and undergone a change of properties.

2. *Slaked lime.* The powder produced by pouring water upon quick-lime; the water is absorbed, the lime swells, evolves heat, and falls to powder. It is then termed *dry lime*, in contradistinction to that of *lime-water*, the former being simply a hydrate, the latter holding lime in suspension with a large quantity of fluid.

4. *Milk or cream of lime.* The hydrate of lime diffused through water.

Liquefaction (*liquefacio*, to melt). The passing of a substance from the solid to the liquid state,—one of the effects of caloric. This term is sometimes synonymous with *fusion*, with *deliquescence*, and with *solution.*

Liqueur. A spiritous liquor, composed of water, alcohol, sugar, and some aromatic infusion, extracted from fruits, seeds, etc.

The same aromatic infusion may give its name to liqueurs of different qualities; thus, one proportion of ingredients gives *eau de noyau*; another, *crême de noyau*; etc. The French distinguish three qualities, viz:—

The *Ratafias*, or simple liqueurs, in which the sugar, the alcohol, and the aromatic substance are in small quantities; as anise-water, noyau, etc.

The *Oils*, or the fine liqueurs, containing more saccharine and spirituous matter; as anisette, curacoa, etc.

The *Creams*, or superfine liqueurs, as rosoglio, maraschino, Dantzic, etc.

Liquid (*liqueo*, to melt). An inelastic fluid. All liquids may be arranged into two great classes, viz., *simple liquids*, as mercury; and *compound liquids*, as combined gases. etc.

Litmus. A blue pigment obtained from the Lichen Orcella. In an earlier state of its preparation, it is of a purplish red colour, and is then called *archil, orchall*, and *orseille de Canaries*. Litmus is employed by chemists for detecting the presence of a free acid.

Litmus paper is prepared by digesting powdered litmus in water, and painting with it white paper which is free from alum.

M

Maceration (*macero*, to make soft by steeping). The steeping of a body for some time in cold or warm water.

Magnesium. A metal having the colour and lustre of silver. At a red heat it burns brilliantly, and forms magnesia.

Malic Acid (*Dor.*, *malum*, an apple). An acid existing in apples, but generally prepared from the berries of the *Sorbus aucuparia*, or mountain ash. By dry distillation it yields another acid termed the *maleic*.

Malting. The process of making malt; it consists in the inducing of an artificial growth or germination of barley, by steeping in water, and then evolving the saccharine principle by the application of heat. This process consists of four distinct stages, viz:—

1. *Steeping*, or immersing the grain in water for about two days, until considerably swelled.

2. *Couching*, or depositing the grain in heaps on the *couch-frame*, for about thirty hours; it then becomes warm and disposed to germinate.

3. *Flooring*, or spreading the grain on floors in layers of a few inches in thickness, to prevent its unequal or partial germination.

4. *Kiln-drying* or arresting the progress of germination, when the saccharine matter is freely developed, by exposure to a gradually increasing temperature in the kiln.

Manganese. A greyish-white metal, found in the ashes of plants, the bones of animals, and in many minerals. The binoxide, used in Chemistry, is commonly termed *native black* or *peroxide* of manganese.

Matter (materia). The general term for designating all ponderable bodies; their ultimate particles are called *atoms.* Material substances have two kinds of properties, *physical* and *chemical*, and the study of their phenomena has given rise to two corresponding branches of knowledge, *natural philosophy* and *chemistry.*

Maximum (superl. of *magnus*, great). A term denoting the *greatest possible* quantity or effect; it is opposed to *minimum*, or the *least possible*; and to *medium*, or the *mean* between these extremes.

Melting Point. That point of the thermometer at which a solid becomes fluid. Thus ice melts at 32°, sulphur at 218°, gold at 5237° Fahr.

Menstruum. A term synonymous with *solvent.* A liquid which does not change the nature of the substance to be dissolved. Thus pure *water* is employed to dissolve gum, *alcohol* to dissolve resins, and *acids* to dissolve the bases of colchicum and squill.

Mercury. A metal differing from all others in being always fluid, unless subjected to a temperature of 39°, when it becomes solid. Some of its names suggest its silvery appearance and liquid form, as *hydrargyrum*, or silver water; others, its mobility and liquidity, as well as its remembrance to silver, as *argentum vivum*, *aqua argentea*, *aqua metallorum* and *quicksilver.* Its volatility has also gained for it the name of that locomotive personage, the message of the gods.

Metals. For table and explanations, see "Chemistry Text Book."

Metre. The French standard measure of length, equivalent to 39·371, or very nearly 39⅜ English inches. The French measures ascend and descend in a decimal progression.

Metric System. This is the French standard of weights and measures, and is on account of its convenience and simplicity now commonly employed by men of science throughout the world, and you will do well to master it because of that fact. And the more this uniformity of usage becomes general the better for all, for it will do away with the waste of time and inaccuracy incurred in converting the weights and measures of one nation into those of another nation. It will be a boon to

the English nation when it is adopted; for how are you to get a decimal out of a shilling, a hundredweight, or a yard?

The unit of length is the metre, which is equal to 39·37 inches, and 10 centimetres are *very nearly* 4 inches, while a millimetre is almost exactly $\frac{1}{25}$th of an inch.

The subdivisions of the metre are marked by the Latin prefixes, DECI, *meaning* 10, CENTI, a 100, and MILLI, a 1,000. The tenth of a metre is therefore called a *decimetre*. The hundredth of a metre a *centimeter*, and the thousandth of a metre a *millimetre*; that is, you see, descending in a decimal progression. The ascending decimal progression is indicated by the Greek prefixes of DECA, meaning 10, HECTO, a 100, KILO, a 1,000. Ten metres are therefore called a *decametre*, a hundred metres a *hectometre*, and a thousand metres a *kilometre*.

This is the measure of length, and you will agree as to the system being very simple and easily acquired when you read that the measures of weight and capacity have the same prefixes, and mean the same number. Thus, the GRAM *is the unit of weight*, and LITRE *is the unit of capacity* and therefore

The 10th of a gram is a	**decigram.**
The 100th ,, ...	**centigram.**
The 1000th ,, ...	**milligram.**
10 grams are a	**decagram.**
100 ,, ...	**hectogram.**
1000 ,, ...	**kilogram.**
The 10th of a litre is a	**decilitre.**
The 100th ,, ...	**centilitre.**
The 1000th ,, ...	**millilitre.**
10 litres are a	**decalitre.**
100 ,, ...	**hectolitre.**
1000 ,, ...	**kilolitre**

Now for a further explanation of this simple system.—1 cubic centimeter at 4° c. (written in books, c.c.) weighs 1 gram, and a 1,000 c.c. is equal to a litre of water, and a litre of water weighs 1,000 grams (1 kilogram).

This shows the correspondence between the French and English Weights and Measures:

1.—*Measures of Length.*

		English inches.		Mil.	Fur.	Yds.	Feet.	In.
Millimetre	=	·03937						
Centimetre	=	·39371						
Decimetre	=	3·93710						
Metre	=	39·37100	=					
Decametre	=	393·71000	=	0	0	10	2	9·7
Hectometre	=	3937·10000	=	0	0	109	1	1
Kilometre	=	39371·00000	=	0	4	213	1	10·2

2.—*Measures of Capacity.*

		Cubic inches.		Tuns.	Hds.	Wine Gal.	Pints.
						English.	
Millilitre	=	·06103					
Centilitre	=	·61028					
Decilitre	=	6·10280					
Litre	=	61·02800	=	0	0	0	2·1135
Decalitre	=	610·28000	=	0	0	2	5·1352
Hectolitre	=	6102·80000	=	0	0	26·419	
Kilolitre	=	61028·00000	=	1	0	12·19	

3.—*Measures of Weight.*

		English grains.		Pounds.	Ounces.	Drachms.
					Avoirdupois.	
Milligram	=	·0154				
Centigram	=	·1544				
Decigram	=	1·5444				
Gramme	=	15·4440				
Decagram	=	154·4402	=	0	0	5·65
Hectogram	=	1544·4023	=	0	3	8·5
Kilogram	=	15444·0234	=	2	3	5

1.—*Troy Weight.*

Pound.		Ounces.		Drachms.		Scruples.		Grains.		Grammes.
1	=	12	=	96	=	288	=	5760	=	372·96
		1	=	8	=	24	=	480	=	31·08
				1	=	3	=	60	=	3·885
						1	=	20	=	1·295
								1	=	0·06475

2.—*Avoirdupois Weight.*

Pound.		Ounces.		Drachms.		Grains.		Grammes.
1	=	16	=	256	=	7000·	=	453·26
		1	=	16	=	437·5	=	28·328
				1	=	27·34375	=	1·7705

3.—*Measures.*

Gallon.		Pints.		Ounces.		Drachms.		Cub. inches.		Litres.
1	=	8	=	128	=	1024	=	231·	=	3·78515
		1	=	16	=	128	=	28·875	=	0·47398
				1	=	8	=	1·8047	=	0·02957
						1	=	0·2256	=	0·00396

N.B.—The English ale gallon contains 282 cubical inches.

Micro-organisms are those organisms which can be seen only by aid of the microscope, such as *bacteria*, *bacilli*, and yeast.

Molecule (dim. of *moles*, a mass). A minute particle of a mass or body. It differs from *atom*, in being always considered as a portion of some aggregate.

1. *Complex organic molecule.* An association of two or more binary compounds, comparatively simple constitution, often isolable substances and possessed of considerable stability.

2. *Integrant molecules.* The name given by Haüy to the last particles into which the nucleus of a crystal can be mechanically divided.

Multiple (*multus*, many). A number which includes another, a certain number of times; as 6 the multiple of 2; 18 the multiple of 6, etc.

Muriatic Acid (*muria*, brine). The *hydro-chloric* of the present time, formerly called spiritus salis, etc.; an acid contained in great abundance in sea-water, in combination with soda and magnesia. It consists of chlorine and hydrogen. Its salts are called *muriates* or *hydro-chlorates*.

N

Nascent State (*nascor*, to be born). A term applied to the state of gases, *at the moment of their generation*, before they have acquired the repulsive power.

Neutral Salts. Salts in which the base is perfectly saturated with the alkali, thus possessing the character neither of acid nor alkaline salts.

Neutralization. A term denoting the loss of characteristic properties, which frequently attends chemical combination. It is exemplified when an acid and alkali are combined in such.

Nitras. A nitrate; a compound of nitric acid with a salifiable base.

Nitre. *Saltpetre.* The common name of the nitrate of potash. When fused, and poured into moulds, it is called *sal-prunella*, or *crystal mineral*; when mixed with charcoal, and burnt, the residuum was formerly called *clyssus of nitre*; mixed with carbonate of potash and sulphur, in a warm mortar, it forms the *fulminating powder*; mixed with sulphur and charcoal, it forms *gunpowder*; and when mixed with sulphur and fine saw-dust, it constitutes the *powder of fusion*.

Nitric Acid. A constituent of nitre of saltpetre. From its corrosive qualities, it is commonly called *aqua fortis*.

Nitrogen (nitre, to produce; so called from its being a generator of nitre). An elementary principle, constituting four-fifths of the volume of atmospheric air. It was formerly called *mephitic air*.

Nitric oxide, or nitrous gas. Formerly called *nitrous air*; but more properly deutoxide of nitrogen. When mixed with atmospheric air, *nitrous acid vapours* are produced, of a red or orange brown colour.

Nitrous acid. Formerly called *fuming nitrous acid.*

Peroxide of nitrogen. A compound forming the principal part of the *nitrous acid vapours* above mentioned.

O

Objective. The object glass in a telescope, microscope, etc., being the glass which receives the image of the object at its focus. A powerful objective contains many lenses, thus making it the most expensive part of the instrument.

Organic. Pertaining to or consisting of organs. Organic bodies are such as possess organs, on the action of which depend their growth and perfection. Organic laws are those which are fundamental to the constitution, or elementary. Organic remains, those of animals or vegetables petrified or imbedded in stones. Organic bodies. Organised vegetable and animal bodies are termed organic, and matter without organisation and incapable of life is inorganic.

Organic Force. A term applied to that power which resides in organised bodies, on which the existence of each part depends, and which has the property of generating from organic matter the individual organs necessary to the whole. It exists already in the germ, and creates in it the essential parts of the future animal. The germ is *potentially* the whole animal; during the development of the germ the essential parts which constitute the *actual* whole are produced. The result of the union of the organic creative power and organic matter is called *organism*, or the organised state.

Oxidation. The process of converting metals or other substances into oxides, by combining with them a certain portion of oxygen. It differs from *acidification*, in the addition of oxygen not being sufficient to form an acid with the substance oxidated.

Oxides. Substances combined with oxygen, without being in the state of an acid. Oxides are distinguished by the prefixes—

1. *Proto* (first), denoting the minimum of oxygen as *proto*oxide.

2. *Deuto* (second), denoting a second proportion, as *deut*oxide. This is also called *bin*-oxide.

3. *Trito* (third), denoting a third proportion, as *trit*oxide. This is also called *ter*-oxide.

4. *Per* (*very much*), denoting the maximum of oxidation, as *per*-oxide.

Oxy (acid). A prefix, denoting in some terms the presence of *acidity;* in others, the presence of *oxygen;* in a third class of terms, *acuteness of sense* or function; and lastly, *sharp-pointedness.*

Oxygen (to generate). A gas which forms about a fifth of atmospheric air, is capable of supporting flame, and is essential to the respiration of animals. Its present name was proposed from the supposition that it was the sole cause of acidity. It is tasteless and invisable. It is the great supporter of combustion. See chemistry book.

P

Pepsin (to digest). A peculiar principle secreted by the stomach, and present in the gastric juice. It is artifically prepared by infusing the mucous membrane of the fourth stomach of the calf, which is known as rennet.

Per. A Latin preposition, which, when prefixed to the name of an oxide, indicates the presence of the greatest quantity of oxygen which can exist in a compound of such materials, as in *per*-oxide.

Bi-per-. This double prefix is used, when there is more than one atom of oxygen in the base, as well as an unequal number of atoms of acid and base, as in the *bi-per*-sulphate of mercury, where *bi* indicates the presence of two atoms of acid, and *per* that the mercury is in the form of a *per-oxide*.

Percolate. To pass through interstices; to filtrate.

Peri-carp. That part of a fruit which constituted the ovarium of the pistil. It consists of an outer coat, or *epicarp*; an inner coat called *endocarp* or *putamen*; and an intermediate substance termed *mesocarp*. The corresponding coats of wheat constitute the bran.

Phosphite. A salt formed by the union of phosphorous acid with a salifiable base.

Phosphorus (light, to bring, so called from its luminous appearance in the dark). A yellow, waxy substance, originally prepared from urine, and afterwards from bones.

Oxide of phosphorus. A red matter, obtained by burning phosphorus in air or oxygen.

Hypo phosphorous acid. An acid obtained by the action of water upon the phosphures of barium.

Phosphorous acid. An acid produced, in the form of a white volatile powder, by the slow combustion of phosphorus. Its salts are called *phosphites*.

Phosphoric acid. An acid obtained, in the form of white flakes, by igniting phosphorus under a large bell jar. Its salts are called *phosphates*.

Peptones. Digested nitrogenous matter.

Polarity. A disposition in the particles of matter to move in a *regular* and determinate manner, and not confusedly, when affected by other agents.

1. *Magnetic polarity.* The tendency of a magnet, when freely and horizontally suspended, to settle spontaneously in a position directed nearly north and south. The two ends of the magnet are called its *poles*,—that which turns to the north, the *north pole*; that to the south, the *south pole*. The straight line joining the two poles of a magnet is called the *axis*.

2. *Two polarities.* A term expressive of two antagonist energies, each of which repels that which is similar, and attracts that which is opposite, to itself. Thus, the two north or two south poles of two magnetic needles mutually repel each other; but the north pole of one needle, and the south pole of another, mutually attract each other.

3. *Reversion of terms.* The earth itself being considered as a magnet, or as containing within itself a powerful magnet, lying in a position nearly coinciding with its axis of rotation, the *south pole* of a magnetic needle would point towards the *north pole* of the earth; so that the *north end* is the *south pole*, and the *south end* the *north pole* of a magnetic needle.

4. *Boreal and Austral polarities.* To avoid the above confusion of terms, the words Boreal and Austral have been applied to the magnetism of the earth, while the terms north and south have been restricted to that of the needle; what had been called *northern* polarity, being now *Austral* polarity; what had been called *southern*, being *Boreal* polarity.

5. *Chemical and cohesive polarities.* Two hypothetical forces, supposed by Dr. Prout to reside in the ultimate molecules of matter; the *chemical* being of a binary character, existing between molecule and molecule, and chiefly between molecules of *different* matter; the *cohesive* determining, under certain circumstances, the cohesion of the molecules of the *same* matter.

Polarisation. The property by which a ray of light, under certain circumstances, acquires *poles*, or sides with different properties, like those of a magnetic bar.

Potassa. Potass, or potash; the Vegetable Alkali, so called from its being obtained by the incineration of vegetables. It is the hydrated protoxide of potassium, and is known by the names of *potassa fusa*, kali causticum, lapis infernalis, causticum commune acerrimum, etc. The term *potash* is derived from the circumstance that the water in which the ashes are washed is evaporated in iron pots.

Precipitate (*præceps*, headlong). A solid substance *precipitated*, or thrown down, from a solution, by adding a re-agent.

Prism (to saw). A solid glass in the form of a triangle, so termed from its separating a ray of light into its constituent parts. A solid, whose bases are similar, equal, parallel, plane figures, and whose sides are parallelograms.

Prismatic Spectrum. The variously coloured appearance presented by a ray of white light, when separated by refraction through a glass prism. This appearance consists of an oblong image, containing seven colours, which are called simple, or homogeneous, in opposition to white light, which is called compound or heterogeneous.

Protein. A gelatinous semi-transparent substance obtained from albumen, etc., insoluble in water, and said to be the basis of animal tissue.

Proto (the first). This prefix denotes the *lowest* degree in which one body unites with another, as *prot*-oxide. *Per* denotes the *highest* degree, as *per*-oxide.

Protoplasm (first, anything formed or moulded). A term applied to the mucilaginous granular contents of the vegetable cell, which is concerned in the elaboration of new cells. The main internal portion of yeast cells.

Proximate Principle. A term applied, in analyzing any body, to the principle which is *nearest* to the natural constitution of the body, and more immediately the object of sense, as distinguished from intermediate or ultimate principles.

Ultimate Principles are the elements of which proximate principles are composed.

Ptyaline is a diastasic principle of saliva. Pronounced "ti'-a-lin."

R

Rarefaction (*rarus*, thin, *facio*, to make). The act of making a substance less dense; also the state of this diminished density. The term is generally applied to elastic fluids, which expand by means of heat, and thence become thinner or more rarefied.

Reaction (*re* again, *ago*, to act). A chemical change.

Reagent (*re*, again, *ago*, to act). A substance employed in chemical analysis, for ascertaining the quantity or quality of the component parts of bodies, by *re-acting* upon their elements. A substance that detects the constituents of a mixture.

Rectified Spirit, or alcohol in nearly its highest state of concentration, commonly called *spirit of wine*. It varies from 54 to 60, or even 64 per cent. *over proof*, in the language of Sike's hydrometer

Reduction (*reduco*, to bring back). A chemical process, by which a substance is reduced, or restored, to its natural state; generally applied to the restoration of metallic oxides to the metallic state.

Retort. A globular vessel of glass or metal, etc., with a long neck bent over on one side, and used for distillation. Some retorts have another neck or opening at their upper part, through which they may be charged, and the opening afterwards closed with a stopper; these are called *tubulated retorts.*

S

Sac. A bag. A term applied to a small natural cavity, as Sac of the embryo. The name given to the innermost integument of the nucleus of a seed, etc.

Sal. A Salt. A definite compound of an acid with an alkaline, or salifiable base. Salts are distinguished by the six following prefixes :—

Super, denoting excess of acid in general, as *super*-tartrate of potash.

Sub, denoting excess of the base, as *sub*-borate of soda. See *Sub salt.*

Bi, denoting two equivalents of acid, as *bi* sulphate of potash.

Quadr, denoting four equivalents of acid, as *quadr*-oxalate of potash.

Sesqui, denoting one equivalent and a half of acid, as *sesqui*-carbonate of ammonia.

Oxy, denoting the presence of a perfect oxide as *oxy* muriate.

Deliquescent salts are those which attract moisture from the air, and become liquid, as the nitrates of lime and magnesia.

Efflorescent salts are those which lose a portion of their water of crystallization, and fall into powder, by exposure to the air, as sulphate and phosphate of soda. By a strong heat the whole of the water is expelled, and the salt, if soluble, is dissolved, undergoing what is called *watery fusion*.

Permanent salts are those which undergo no change on exposure to the air.

Decrepitating salts are those which burst, when heated, with a crackling noise, into smaller fragments, as the nitrates of baryta and lead.

Neutral salts are those in which the base is perfectly saturated with the acid. It does not, however, follow that neutrality and saturation accompany each other: an alkali may unite with an acid so as to saturate it, though it still manifests alkaline properties.

Double salts, formerly called *triple* salts, are composed of one acid and two bases, of two acids and one base, or of two different acids and two different bases.

Native salts are mineral bodies, resembling precious stones or gems in their external character, and so named to distinguish them from artificial salts.

Sub-salts, or neutral salts, are those in which the excess of oxide does not stand in the relation of base to the acid.

Common salt, or Bay salt, a muriate of soda, is procured, by evaporation, from sea water, or from the produce of brine springs, or from mines.

Solution (*solvo*, to dissolve). The act of dissolving a solid or aëriform body in a liquid; this liquid is called the *solvent*. Also, a liquid containing a dissolved body.

Spore. The reproductive body in Flowerless plants, which is anologous to the *seed* of Flowering plants, but differs from this in not germinating from any fixed point, but in producing its root and stem indifferently from any point of its surface.

Symbols, Chemical. An abbreviated mode of expressing the composition of bodies. The elementary substances, instead of being written at full length, are indicated by the first letter of their names, a second letter being employed when more than one substance begins with the same letter,—thus C stands for carbon, Al for aluminium, As for arsenic, &c. Sometimes the substances are indicated by their abbreviated Latin name: for instance, sodium chloride or common salt is written Na. Cl. and not Sod. Cl.

T

Temperature (*tempero*, to mix various things in due proportions). The comparative degree of active heat accumulated in a body, as measured by an instrument, or by its effects on other bodies. Temperature, however, must not be confounded with "quantity of heat." A cup of water dipped from a gallon would be of equal temperature, but would not contain equal quantity of heat as a gallon.

Tenacity (*teneo*, to hold). The degree of force with which the particles of bodies cohere, or are held together; a term particularly applied to metals which may be drawn into wire, as gold and silver.

Thermometer. Literally, a *measurer of heat*; an instrument for comparing the degree of active heat existing in other bodies, by its effect in expanding a column of mercury.

1. *Fahrenheit's Thermometer.* That arrangement of the scale of the instrument, in which the space between the freezing and the boiling points of water, under a medium pressure of the atmosphere, is divided into 180 parts, or degrees, the freezing being marked 32°, and the boiling 212°. This scale was adopted by Fahrenheit, because he supposed, erroneously, that 32 of those divisions below the freezing point of water (which was therefore 0 on his scale) was the *zero*, or greatest degree of cold.

2. *Centigrade Thermometer.* This is the thermometer of Celsius, which is used in France, and is the most convenient in practice: it consists in that arrangement of the scale in which the freezing point is marked 0, or *zero;* and the boiling point 100.

These different modes of graduation are easily convertible: the scale of Centigrade is reduced to that of Fahrenheit by multiplying by nine and dividing by five, and adding 32°; or that of Fahrenheit, by reversing the process. Thus—

C. 100° × 9 = 900 ÷ 5 = 180 + 32° = 212° F.

Or, by reversing the order—

F. 212° — 32 = 180 × 5 = 900 ÷ 9 = 100° C.

This table is added, shewing the correspondence of the two thermometers.

Fahrenheit.	Centigrade	Fahrenheit.	Centigrade.
212	100·	100	37·77
200	93·33	90	32·22
190	87·77	80	26·66
180	82·22	70	21·11
170	76·66	60	15·55
160	71·11	50	10·
150	65·55	40	4·44
140	60·	30	0·
130	55·55	20	— 6·66
120	48·88	10	— 12·22
110	43·33	0	— 17·77

Tissue. *Tela.* A web, or web-like structure, constituting the elementary structures of animals and plants.

V

Vaporization. The conversion of a liquid or solid body into vapour. This may be considered under two heads, viz:—

1. *Ebullition*, or the production of vapour so rapidly, that its escape causes a visible commotion in the liquid; the temperature at which this takes place is called the *boiling point.*

2. *Evaporation*, or the production of vapour in a quiet and insensible manner at common temperatures.

Vapour (*vapor*). Any liquid expanded into an elastic or gaseous fluid by means of heat. It differs from *gas* in its want of permanency, for it returns into the liquid state when exposed to a diminished temperature. Bodies which are so convertible by heat, are termed *volatile*; those which resist the heat of the furnace without vaporising, are said to be *fixed* in the fire.

Viscid. Not readily separating, sticking together, glutinous.

Vis Inertiæ. Inertness, or the principle of inactivity, by which a body perseveres in the same state of rest or motion, in a straight line, unless obliged to change it by a foreign force.

Vis Vitæ. The natural power of the animal body in preserving life.

Volume (*volumen*, from *volvo*), to roll. The *apparent* space which a body occupies is called its *volume;* the *effective* space which the same body occupies, or its real bulk of matter, is its *mass;* the relation of the mass to the volume (or the quotient of the one by the other) is its *density;* and the empty spaces, or voids, which render the volume larger than the mass, are its *pores*.

Definite volumes. The union of gases is always effected in simple proportions of their volumes: a volume of one gas combines with an equal volume, or twice or three times the volume, of another gas, and in no intermediate proportion; this is called the law of *definite volumes*.

W

Water. A compound of hydrogen and oxygen in the proportion of two atoms of hydrogen to one atom of oxygen. It is a powerful solvent, and absorbs and holds the gases which are present in the atmosphere. It is estimated that nearly three feet of water, in the form of rain, snow, etc., fall upon the surface of Great Britain every year, being sufficient to average over fifteen tons per day to every individual. Of course the greater part falls upon the ground, and cannot be used for cleansing or drinking purposes. Fifteen tons is enough to enable each to "wash and be clean," with a drop to spare for cooking apparatus, machinery and farm; but if unused or allowed to remain stagnant may mean fever and undertaker, and should necessitate a constant supply, and no cisterns or tanks, or at least, a monthly cleansing of tanks.

The total solid extract—mostly impurity—given by water analysis, when a sample has been evaporated to dryness, represented in best river water, is about three parts per 100,000; from deep wells—best—10 to 15; from chalk wells, 20 to 30. The appearance of water is no guide to the wholesomeness of its condition; crystal clear water is often made so by the chemical action of sewage upon it.

Degrees of hardness of water is estimated by equal grains present of hardening salts—carbonates, calcium, magnesium, etc. For each grain present, estimate one degree of hardness. Ordinary temporary hardness is due to the presence of carbonates of calcium and magnesium, which are precipitated by boiling; but such boiling must be continued for some time—say quite an hour. The permanent hardness of water is due to the presence of sulphates—lime, magnesia—and is not altered by boiling.

Carbonate of soda, added to boiling water, will decompose these sulphates.

To soften water for breadmaking, or for culinary purposes, where carbonate of soda cannot be used, mix one ounce of quicklime with every 30 gallons of water, dissolve, and well mix, and allow to settle for 12 hours. The sediment will be ordinary whiteing. If necessary, to ascertain the exact amount of lime required, mix a solution of nitrate of silver, using distilled water for the pupose, put a few drops into a white earthenware vessel—a gallipot will do—and add the hard water and lime in definite quantities until the faintest yellow tinge is produced. The measure of hard water and the weight of lime used, will then determine the proportions necessary for perfect softening.

Simple tests for water are: For impurities in suspension, boil down a quart in an evaporating dish (any porcelain vessel that will stand the heat) to dryness. If the deposit is white, there is not much the matter with it for health, but if yellow or green tints are present, or if gummy and emits a smell like burning leather or feathers, then these signs show the presence of hurtful organic matter. If the water is impregnated with vegetable refuse, manure, etc., a few drops of an acidulated 5 per cent. solution of permanganate of potash will be discoloured—all the purple taken out of it. The chemistry of this reaction, decayed organic matter attracts oxygen, and the permanganate contains oxygen in a state be removed in this way. The more organic matter the more drops of permanganate will be discoloured. Try two or three different kinds of water.

Ice, water, steam superheated to gaseous vapour, are all the same thing—it is all water at different temperatures, ice being only solidified water.

Z

Zero (probably from the Arabic *tsaphara*, empty). Nothing. It is used to denote a cypher, and to fill the blank between the ascending and descending numbers in a scale or series.

Zsymae. Is a diastasic principle of yeast.

CHAPTER III.

ABOUT OUR RAW MATERIALS.

FLOUR, YEAST, SUGAR, CARBONATES, ACIDS, BUTTER, MARGARINE, EGGS, ETC.

THE GAS-ENGINE AND FERMENTATION.

IT is not sufficient for the workman to know how to put certain quantities of ingredients together, he ought to know something about the ingredients. It is not enough for the hangman to know how to tie a proper sort of knot, and to know the position to put it in so as to asphyxiate, he should know about the make up of the rope, and its strength, or it may break and spoil his work. The carpenter may know how to push a plane and use a saw, but unless he knows something of the different properties and characteristics of yellow and white deals, pine, oak mahogany, solid geometry, etc., he will not be worth much in the labour market. What would be the good of a doctor if, knowing the position of a nerve or artery, he did not know how to use or the size or shape of lancet to use? It is absolutely essential to his success that the baker should know as much as he can about his materials.

The less waste the more profit, and should be better stipend.

Some things look better than they are by being placed by the seller upon a suitably coloured sample paper, which, though enhancing the appearance of the article, *does not add to its intrinsic value*. *Be careful of blue sample papers* when buying flour, castor sugar, etc. Have a constant remembrance that raw materials must be bought with a reference to the price to be obtained for the manufactured article. A tradesman lives by profit, and a workman by the excellence of his work, such excellence being judged by the class of work turned out from a particular class of materials, whether the material be common or first class.

ABOUT FLOUR FROM WHEAT.

The constituents of flour can be conveniently shown in simple words as follows :—

Carbo-hydrates	Starch Woody fibre		Insoluble.
	Sugar .... Gum		Soluble.
Albuminoids ...	Gluten	Gluten Fibrin	Insoluble.
	Albumen Legumin Cerealin		Soluble.
Mineral matter, Ash.			
	Water.		

It will be seen the constituents are divided into three main classes. The carbo-hydrates are so called because they are composed of carbon, hydrogen, and oxygen, and hydrogen and oxygen being found in them in the proportions of two to one, namely, in the proportions in which they form water (H_2O). The albuminoids are the nitrogenous portion, or those parts of the flour which contain nitrogen and nutriment. The mineral matter consists of phosphoric acid, potash and magnesium, and such salts as are taken from the soil during growth. The proportions of these constituents vary, and in some cases considerably, according to the variety and condition of the flour; but the starch, gluten, and water constitute fully 90 per cent. of the grain, in the respective approximate quantities of 65 to 70 per cent. starch, 12 per cent. water, and about 12 per cent. of albuminoid and proteid (gluten, fibrin, and albumen).

The Composition of Cereals.

It will be useful to the baker to know the difference between different kinds of grain, to consider the constitutents of the chief cereals, and to compare them, not only among themselves, but also with the more important articles of food employed by man. In the following table you will find a statement of the component parts of these cereals, wheat, barley, oats, rye, maize, and rice. The student must, however, remember that wheat, oats, rye, barley, maize, and rice have nearly the same chemical composition, but that the quantities in each of starch, cellulose, water, fat, sugar, albuminoid and proteid matter vary considerably, and that different samples of the same cereal also vary in the proportions of these constituents—that a wet wheat will contain more water than a dry wheat, and a strong more albuminoid matter than a weak, and therefore there are different percentages in different samples.

Average Composition of the Grain of Cereals.

	Old Wheat	Barley	Oats	Rye	Maize	Rice
Water	11·1	12·0	14·2	14·3	11·5	10·8
Starch	62·3	52·7	56·1	54·9	54.8	78·8
Fat	1·2	2·6	4·6	2·0	4·7	0·1
Cellulose	8·3	11·5	1·0	6·4	14·9	0·2
Gum and Sugar	3·8	4·2	5·7	11·3	2·9	1·6
Albuminoids	10·9	13·2	16·0	8·8	8·9	7·2
Ash	1·6	2·8	2·2	1·8	1·6	0·9
Loss, etc.	0.8	1·0	0·2	0·5	0·7	0·4
	100·0	100·0	100·0	100·0	100·0	100·0

Bearing some of these numbers in mind, if we take the following table, having reference to the articles of food most used by man, we find that the ratio of carbon to nitrogen, in the case of flour, is 38 to 1·7, in meat as 30 to 2, in potatoes as 11 to ·3. We therefore notice that in the case of these cereals we have a considerable quantity of flesh-forming albuminoid matters, more especially in the case of wheat.

Average Composition of Articles of Food.

Foods.	Dry Substance.	Carbon.	Nitrogen.	Nitrogen. to 100 Carbon.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Meat (fresh)	45·0	30·0	2.0	6·6
Bacon (dried)	85·0	61.0	1·4	2·3
Butter	85·0	68·0	0·0	..
Milk	10·0	5·4	0·5	9·3
Cheese	60·0	30·0	4·5	12·5

Average Composition of Articles of Food.—*Continued.*

Foods.	Dry Substance.	Carbon.	Nitrogen.	Nitrogen to 100 Carbon.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Flour (Wheaten)	85·0	38·0	1·72	4·5
Bread	64·0	28 5	1·29	4·5
Maize	87·0	40·0	1·75	4·4
Oatmeal	85·0	40·0	2 0	5·0
Rice	87·0	39·0	1·0	2·56
Potatoes	25 0	11·0	0·35	3·2
Vegetables (succulent)	15·0	6·0	0.2	3·3
Peas	85·0	39·0	3·65	9·4
Sugar	95·0	40·0	0·0	..

'We may conveniently divide the constituents of the cereals into three classes. In the first group, those constituents which, by being burnt up in the system, produce heat. They are the materials which we call carbo-hydrates—the starch, the gums, and the sugars; it is from the oxidation of these carbo hydrates, and also from the fat in our food, that the greater portion of the force which man exerts is derived. The next great division it will be convenient to take is the albuminoids, or flesh-forming elements of the cereals; and, lastly, the ash, which, although not great in quantity, is still most important in its bearing on the physiological phenomena which go on in the cells of animal life, and also because it is from the mineral matter of the ash that the bone structure of man is built up.

'The ash of wheat contains nearly one-half of phosphoric acid. There is also a small quantity of phosphate of iron. Phosphoric acid, potash and magnesia are the characteristic constituents of the ash of wheat.

FORMULÆ OF CARBO-HYDRATES.

$$\left.\begin{array}{l}\text{Starch}\\\text{and}\\\text{Dextrin}\end{array}\right\}=(C^{12}H^{20}O^{10})n.$$

$$\left.\begin{array}{l}\text{Cane Sugar}\\\text{and}\\\text{Maltose}\end{array}\right\}=(C^{12}H^{22}O^{11}).$$

$$\left.\begin{array}{l}\text{Dextrose}\\\text{and}\\\text{Lævulose}\end{array}\right\}=(C^{12}H^{24}O^{12}).$$

'We use that expression in order to indicate that hydrogen and oxygen are found in the carbo-hydrates, in precisely the same ratio as they occur in water. These two elements, hydrogen and oxygen, do not exist in starch or sugar as water; but they exist in the same proportion as they do in water, and that expression has been applied to all these bodies.

'The next subdivision of this important class of bodies embraces cane-sugar and maltose.

'They are isomeric, that is to say, that they have precisely the same ratio of carbon, hydrogen, and oxygen in their molecular composition; but they differ from the previous sub-groups in having one of oxygen and two of hydrogen more in the formula given. The last subdivision of this group embraces the glucoses, the simplest formula expressing their molecular composition being $C^{12}H^{24}O^{12}$. Here also we notice an increase of two of hydrogen and one of oxygen over the cane-sugar group, which differs from the starch group in the same manner.

Starch is the first on our lists of the carbo-hydrates to which I have now to direct your attention. Starch is found in various

vegetable structures, and for much the same purpose as fat is stored up in animals, for the future use of the organism.

'If you take the caryopsis of wheat, the small embryo will be found at the bottom, surrounded by a large mass of starchy matter. It contains not merely starch, but also albuminoid bodies, and this, in botany, is called the albumen of the seed; for the reason that, in the case of an ordinary hen's egg, the white of the egg surrounding the embryo is called albumen, and in both cases the albumen serves for the future growth of the young embryo. Starch is also found very largely in the fleshy cotyledons of some seeds, as, for instance, the ordinary bean, horse-chestnut, or pea, where practically the whole mass is made up of the two thick fleshy leaves, which constitute the two halves of the whole seed, the young embryo being at the bottom. We see, therefore, that in all structures which are intended for the future growth of the plant, or, as in the case of seeds, for the reproduction of the new plant, we find stored-up starch.

Starch, however obtained, consists of minute cells, and these cells differ in size and also in form, according to their origin. The cells obtained from the potato are about $\frac{1}{150}$th of an inch in diameter; those of sago are about $\frac{1}{800}$th, the cells obtained from wheat are about $\frac{1}{500}$th of an inch in diameter, and there are many smaller than those of wheat. The cell of potato starch, however, is larger than most; it is only exceeded in size by the cell of arrowroot. All the starches have characteristic appearances under the microscope, and it is on account of the difference of form and the difference in size that we are able to determine the cereal from which it comes. All starches have *the same food value and exert the same influence* in the functioning of man or beast.

The Albuminoids and Proteids. Their general composition is given in this table:—

Average Composition of Albuminoid and Proteid Matter.

Carbon	53·3
Hydrogen	7·1
Nitrogen	17·7
Oxygen	22·1
Sulphur	1·8
	100

The numbers given here will fairly indicate the general nature of the albuminoid bodies:—Carbon, 53·3; hydrogen, 7·1; nitrogen, 17·7; oxygen, 21·1; sulphur, 1·8.

The albuminoids of wheat flour differ very much from those of the other cereals—10·9 is given to old wheat, 13·2 to barley,

16 to oats, 8·8 to rye, 8·9 to maize, 7·2 to rice. Oats and barley are very rich in albuminoids, wheat is pre-eminently rich in the proteine bodies, and the value of any given sample of wheat flour would depend entirely on the total quantity of albuminoids in the wheat.

In the husk of wheat, that which one separates under the name of bran, occurs another albuminoid body called cerealin. Cerealin has a very marked action upon starch—in other words, it acts as diastase and malt infusion, and the object of its being there, gathered together mainly in the bran, is for the purpose of enabling the young germinating plumule to obtain a large supply of nutriment, not entirely from the starch, but to a great extent from the cellulose structure of the outer layers of the corn. The cerealin, like many of the albuminoids, is precipitated by alcohol and also by acids. Now these soluble bodies, legumin, albumen, and cerealin, one or more of them occur in all seeds, and the reason why they occur in seeds is that they thereby present, under the germinating process, precisely what chemists use in the researches upon starch, a material which has the power to convert the starch, and even the cellulose, into soluble materials, because you will remember that starch and cellulose are insoluble in water, whereas when converted into various sugar bodies they dissolve, and can be absorbed by the cells of the young growing plant.

The tendency of all albuminoids, even those which are insoluble in water, and even that which is the most complex in its structure, namely, fibrine, is to degrade, to become less and less complex, and ultimately, of course, to become soluble in water. The degradation of molecular structure is communicated to the complex molecular structure of starch, so that the complexity of the starch undergoing the peculiar degrading action which goes on in the albuminoid molecule is itself converted into molecules less complex than starch, namely, into maltose and dextrine; in some cases there may be also the production of other sugars. We see, then, that the albuminoids are powerful degraders, or breakers down of the complexity of molecular structures. But that is not the only interesting point connected with nitrogen. Curiously enough, we speak of nitrogen as being inert, and as being merely used, as it were, for the purpose of diluting the oxygen of the atmosphere; hence we are all very liable to look upon nitrogen as playing a comparatively unimportant *rôle* in the phenomena of nature; and yet, strangely enough, were it not for the action of nitrogen, or rather of the compounds of nitrogen, there would be no life whatever in this world; there could be no simple cell even built up without the action of this marvellous architect, the nitrogenous compound. Every cell-structure, and of course every large aggregation of cell-structures, such as an oak-tree or a man,

containing many millions of cell-structures, are all built up by the wonderful agency of nitrogen, or rather of its compounds. But, while nitrogen is so important an agent, so marvellous a builder up, it is for very similar reasons equally powerful in breaking down. Whenever you have albuminoids present, if there be moisture sufficient, and if there be warmth sufficient, there you have the agent ready for degradation.

Flour may be relatively or potentially, rather than actively, bad. It is hardly speaking correctly when we talk of *bad* flour; some good is positively present in all flours, and it would be preferable to speak of certain kinds as being suitable or unsuitable for the purpose required. The flour that would be classed A, 1 in a prison, poorhouse, or by the Army or Navy commissariat, would be called rubbish by the city baker; and what the city baker would class as good, the *chef* or baker of the upper classes would look upon as inferior; and what he says is excellent, the whole-meal advocate would put down as positively injurious to health. Flour is only relatively good or bad according to the uses to which it is put.

Flours are usually divided into four chief grades.—

American		Equivalent in English.
1st Patents	... ...	Whites
2nd Patents	... ...	Supers
1st Bakers	... ...	Households
2nd Bakers	... ...	No. 2's

but the up and down varieties of these grades—both English and American—are very numerous. Some millers make a speciality of one grade, and make the best they can of the bye products of that grade; in some cases as many as five different classes from the one grist of wheat. Others do not make such acute or so many divisions, but endeavour to make standard 1st, 2nd and 3rd grades, each within a Shilling or so value of the other. It will not be safe, therefore, to buy flour by the name of its grade. For the quality of that particular grade will depend upon the number of grades made out of the same grist of wheat. As a matter of opinion, I believe the English mode of classification preferable to that of America, and if the responsible English miller will be content with the profits obtained by the American, and imitate him in his progressive milling, and put as much brains into it as he of America does, then the English baker, handling whites, supers, households, and No. 2's, will be safer than when handling the 1st and 2nd patents and 1st and 2nd bakers' grades of the—to him—irresponsible firms beyond the seas; but, in either case, the baker must depend upon his own knowledge to test his flour, for in no case does the name of the firm or the name of the grade give him the security sufficient to dispense with such knowledge, or to save him from a money loss.

The important and clever improvements in milling machinery have paved the way for the technically and commercially educated miller to change the nomenclature of his flour, hence the names Patents, Bakers, and Straights. Rolls enable the miller to obtain flour from the heart of the wheat minus the germ and the bran, which are cast out and not ground in and *partly* dressed out as in the case of stone milled flour. **Patents** are good allround flours, but will differ in quality and commercial value in ratio to the quality of the wheat employed in their making, the quantity of patents taken off the grist, combined with the fineness of the dressing.

Straight Grade Flour

is the name given to flour obtained from wheat without any part being taken away or having any other kind of flour added to it, and its value to the baker will depend upon the quality of the wheat used. Straight Grade flours are necessarily strong, dark, and coarse flavoured, owing to the insufficient dressing. To dress them finely would be to take away some of the flour, and then it would not be a Straight Grade.

Bakers' Grade Flour

is the residue of grists from which the patents have been taken—forty, fifty or sixty per cent., differing in quantity in different mills. The prevalent custom being to have hoppers and spouts fixed at suitable junctions, from which is run into this residue, as it passes along, either a bought flour from other mills or a straight run flour of an inferior grist of the same mill, and any other suitable flour. Bakers' Grades are coarse-flavoured, dark, strong flours. (Bakers should resent having their names put to this worst class of flour.)

Whites and Country Whites.

The acute difference in quality of these flours will forcibly explain what I have been trying to show in reference to the delusion and snare involved in buying flour by name. The practice of London mills is to make Whites their standard and best flour. The Whites of provincial mills is the worst flour made, and up to 1890 the term Country Whites was synonymous with all that is weak and "wish-washy" in flour, and it must be remembered that there is no law to make millers designate their flours correctly, and Patents and Whites may not be what they are named. A "High Ground" granulated flour, rough to the touch, and that will not form a ball, but breaks and separates easily, is evidence that not much, if any, of the best parts have been taken out of it; but its actual value will depend upon the

quality of the grist used, the amount of the best part it contains, the amount of the worst parts taken away, and the mode of its dressing. A flour that forms a ball when squeezed in the hand, that feels wooly, that feels soft and greasy when rubbed between the fingers, and that forms beads or peas when taking the sample paper containing it with both hands and making a rapid circular motion, shows that it is a damp, damaged, or residue flour from which the best has been taken, and its value will depend on how much has been taken from it, and also upon its condition and dressing.

Gluten—Gliadin, Glutenin, Fibrin,

OR IN OTHER WORDS THE MUSCLE AND SINEW OF THE FLOUR OF WHEAT.

HOW TO ESTIMATE ITS PRESENCE, QUANTITY, AND QUALITY AND ITS VALUE IN BREAD-MAKING.

We are now getting into the arena of work, and may not occupy more space (to do our duty we could not have occupied less) with a discussion of the Chemistry of these subjects.

The term gluten becomes more and more narrowed in its meaning to the baker as the years go by. Yesterday all the glutenous substances in cereals were classed as gluten; to-day the word gluten covers only that part which can be separated by washing the flour in water, is insoluble, and when obtained is elastic and tenacious. There are small quantities of glutenous substances obtained from rice, maize, and other cereals besides wheat; but they are not elastic, will not stretch out, will not retain the gas generated during fermentation, and hence they have ceased to be classed as gluten.

Crude gluten while wet is a soft, sticky, looking mass, and consists of the insoluble albuminoids of the wheat; it contains three albuminoids, glutenin, gliadin (vegetable gelatine), and fibrin. To the baker, although gluten may be by the chemists split up into several bodies, they have such a close relationship that it will be probably only necessary for him to call and know them all as gluten, at any rate this study can wait until to-morrow without loss to the workman.

Gluten is insoluble in water. When gluten has been dried and wetted again it loses its expansive power or principle. When dry it resembles glue, lighter in colour, but hard and shining.

Gluten when wet and left in contact with water is subject to the ordinary fate of moist nitrogenous substances. It decays and decomposes, and in that state, and exposed to atmospheric

influences, it emits the usual unpleasant smell accompanying decay. Its elasticity is also broken down, and it will be found to be in a state of chemical transition, having new properties which will displace (according to the time it remains in the wet state) the power of expansion and gas-holding capacity for bread-making purposes; but this chemical change also takes place in some degree during fermentation. The weaker, warmer, and wetter the dough is, the more rapid and thorough will this change be. This change is necessary in bread-making, we call it mellowing or ripening. It is owing to the excess and stability of gluten in wheat over the other cereals which makes the flour of wheat better for bread-making purposes than that of rice, barley, maize, etc. The presence in flour of a greater or lesser quantity of gluten does not prove its bread-making worth to the baker. The quality of the gluten, on the other hand, does.

Gluten tests are easy and reliable, and afford a safe guide when estimating value. It is not necessary when testing for gluten to adhere to a particular weight or measure, except when it is to be comparative, and then great care should be exercised to the end that each sample should have equal treatment. The water and flour of each should be carefully weighed and measured and every particle of gluten secured and accurately weighed. The colour of glutens alternates from a very pale glossy brown and yellow—the best, to the dark brown and slate colour of the worst.

To make a Gluten test for use in the bakery, and when flour buying, take 20 grams flour and 10 c.c. of water, place in a basin and mix it into a clear dough, cover it up and let it lie three hours; weight 15 grams (this will give you 10 grams of flour, and therefore be a 10 per cent. estimation), then enclose it in a piece of miller's silk (or a better way when you have had some practice is to hold it in one hand, and gently squeeze under the water with the other—this prevents the sticking); tie the ends up and hold it under a dribble of water from the water-tap over the sink; work it about gently with your hand until all the starch is washed out and the water runs away quite clear, and not milky; then take out the gluten from the silk and carefully weigh it and tabulate how much remains. This will show the difference in volume. Then take the wet gluten and test the difference in the elasticity by pulling and stretching, note the difference in colour, and then bake to show expansion when baking; shut the gluten up in a tin box or inverted bread tin, and in every case so protect it from actual contact with oven bottom that the utmost expansion may take place before it is fixed and set. When the glutens are baked, judge difference in strength by the difference in size, also notice the colour after it is baked.

Please note.—The test, to be of any value, must be carefully carried out; no flour must be spilt; the dough must not be made with hand, because some would stick to the fingers; use a glass rod, spatula, or failing these, something smooth, such as the handle of a metal spoon; no dough must be allowed to stick to the basin, and there must be exact weight of flour and gluten; lastly, see that no gluten is left on the silk.

To test Flour for Colour Comparison.

The following is a simple and reliable test. Press the flour down firmly and smoothly into a very small box and dip it slantwise under water until the whole of the surface is thoroughly wet, withdraw and place somewhere out of the dust to dry. This wetted and then dried sample will show the colour the flour will be when wetted into dough, and then baked into bread or boiled as a pudding.

There are five plain divisions of colour in flour. *First* and best, *orange yellow* of lighter or darker shades according to richness in gluten, quality of grist, and fineness of dressing. *Second* and good, *yellowish brown*, lighter or darker according to quality of grist, and whether all the best of the flour is left in or some taken out. *Third, reddish brown*, a common, coarse class of flour, shows that some of the fine white has been taken out of it. *Fourth, white.* The whiter a flour shows by this test, the higher in starch and therefore lower in gluten. It is the gluten which gives the yellow or pale brown. The reddish brown is caused by fine particles of bran and offal impurities. To be very white means that bran and gluten are both vanishing quantities. The *fifth division is grey*. A dark grey flour means a dirty flour. There is nothing in the wheat kernel to form this dark greyness. Sometimes when washing for gluten you will come across a sort of a slate colour, but always in very common flour, and I think even a greyish or slaty gluten means dirt chiefly.

This wetting of flour for testing the colour is very eductional. It will, when understood, give you a good idea of the all-round quality of the flour without further testing. Small match boxes make excellent test boxes at no cost, or if you prefer something better, have the same size made in zinc—not tin, it rusts. Also for this test a good pocket lense is very necessary, you can see the little black and brown specks which come from cockle and bran, and therefore mean bad milling, or common flour and cheap flour.

To Test For Water Absorbing Capacity.

Weigh 20 grams of the samples of flour you wish to test, and add to them each 10c.c. of water, mix into dough, and judge of

the different degrees of stiffness. To the stiffer or harder samples add another c.c. or two to bring them to same consistency, and then calculate the percentage. (If you refer back to the Metric System, you will see that a c.c. of water weighs 1 gram, and in these tests you have so many drams of flour and so many grams of water.)

Let the wet dough stand covered up twenty-four hours, the flatter it runs out the softer the flour. You will note that this mode adds more water to the stiffer dough, which is rather difficult. There is another and rather better mode, that of adding more flour to a given quantity of water; this is easier to do. It is called the converse method, and is copyrighted by Mr. Williams, baker, Edenderry, Ireland, who will, upon application, give all particulars.

For weighing the flour in this test and the flour and gluten in the gluten test, you will require a small chemical balance and set of gram weights, and for measuring the water a 100 graduated c.c. pipette, with a piece of indiarubber tubing and a spring clip attached.

How to make a Baking Test.

This is a simple, and if carefully conducted a reliable test for the bread-making qualities of flours. Make your standard heat for testing, flour 60°F., water 100°F., and quantities always 21 ounces of flour, and 11 ounces of water to start with. (This quantity of water is a little over half the weight of the flour. All normal flour will require half its own weight in water to make it into a pliable dough, ½ lb. water to every pound of flour.)

Small baking tests should always be baked in a tin, and as all such tests, to be of any value, must be for the purposes of comparison, they should always be baked in a tin the same size and the same shape exactly, and should be of a full size so as to prevent much of the loaf being above the top and spreading over, which, if it does, will make the measurement after baking uncertain.

Some flour will be drier than others, but by practice you will get very near to a standard of consistence for yourself if you start with the 11 ounces of water, and then add a little more if firmer than your standard.

To begin this testing it will be wise to start with all the flours you have in stock that you know the quality and behaviour of.

To make these tests proceed as follows: Have ready as many basins or pans as you have tests; stick a lable upon each corresponding to name of sample. Weigh 21 ounces of the sample, and put it into the basin. Put on the flour ⅕ of an

ounce of salt, and as much sugar as will cover a sixpence, weigh on your ordinary moveable pan scales or otherwise 11 ounces of water at 100° Fahr. Separate ½ ounce of yeast into it, pour it on the flour, and make up the dough. If you have more than one, have everything for each weighed ready, and then mix all as quickly as possible.

Don't spill any of the flour, don't let any remain upon the mixer. Cover these up, put in a temperature of 70° Fahr., and leave to prove two hours. Then carefully note appearance of each. Knock together, have ready the tins, a label with name of each, mould the loaf and stick the label upon it, don't mould two at a time, mould one, and mark it with its label at once. When in the tins put each in a moist, warm place, and let prove until the very first sign of a cracking on top appears, and then bake. Some will move faster than others, so don't put all into oven at same time unless all are ready. When baked allow to get cold, and with a sharp knife cut through the middle from top to bottom, and with a rule measure its height; you have already the length and breadth of the tin. Then note colour and general appearance, taste and smell, and enter all particulars in a book, and the name of flour and its price. You must be careful to mould every loaf alike, one person only should touch testings, your book together with memory and experience should place your judgment upon a sound basis.

Blending Flour is a most important function, and considerable care and attention should be given to this part of the day's work (or if possible to blend for a week or month it would be better still). *Blend it altogether*, don't separate for sponge and dough; unless the stages are very unequal—a long-time sponge, and short-time dough; in that case, use the hard, dry, foreign flour in the sponge, and soft English, or American Winter in the dough! but where the dough stands for, say, three hours, then it should be all mixed together. But however it is used, the point to aim at is the degradation of the gluten; and the effect of putting the soft flour in at the same time as the hard is to hasten the degradation of the hard, and to increase the moisture of the loaf by so doing. The soft flour having become changed, it has the power to change others with which it may be in contact, just as decaying fruit will hasten the decay of the sound fruit surrounding it. It is essential to good bread that the starch should be more or less converted into gum and sugar, and yeast has great difficulty in doing this with hard flour if unassisted; and if this conversion does not take place—at least partially—the bread will be harsh and lack flavour. It must therefore take place; and the baker who can so adjust his working as to effect the flour conversion *without giving the yeast time to impair or destroy it* is the baker

who will make bread universally appreciated and purchased by the public. Break the gluten of hard flour down, and degrade it as soon as you can, the quicker the degradation the less acid.

The term strength, as applied to flour, is usually understood to mean power to retain the generated gas, to absorb water, to retain a tough, dry consistency in the dough stage, and to make a bulky, glossy piled loaf; also, strength means to a baker a stability sufficient to resist and support the degrading action of hydration and diastasis. The more stable a flour is in its make-up (soundness of grain, maturity, etc.), the better able it will be to sustain fermentation, and make a well-finished loaf.

When buying flours for use in his business, the baker should strive to obtain a flour that will keep his bread uniform. This is the most important essential, as few things tend to disturb a connection so much as bread of a varying quality, especially when there is plenty of competition. Experience in business proves that a larger or whiter loaf is nearly as disturbing as a smaller or darker one, for unless that whiteness is kept up, "it will only serve to make the darkness more visible" when it returns; therefore always aim to obtain uniformity in size, colour and flavour.

Buy your flour as you buy other goods, from firms of good reputation, who know the baker's requirements, and specially cater to supply them. Why do not bakers buy flour as they buy butter and confectionery, with a guarantee from the flour-sellers that no adulterants are mixed with it, that it contains a certain per centage of gluten, that it will absorb so many quarts of water to the sack, and that its colour is number so-and-so in the colour scale?

"Age" will generally improve all flours, especially those that are milled from soft or damp wheat, or wheats that are damped before milling. The effect of moisture is to degrade (break down, corrupt) the albuminoids, to increase the soluble matter, to seriously interfere with the *tenacity* of the gluten, and lessen its power to retain the generated gas—this will be in proportion to its dampness and to the length of time it has been kept in a damp state. Flours should, therefore, be kept in a very dry place; all soft flours should have plenty of room in the store—in single rows if possible, and not piled one upon another to a great height, which, unless in the case of hard dry flours, will be harmful. The storage of flour should have much more care bestowed upon it than is usually done in the majority of cases.

ABOUT YEAST.

YEAST is intimately associated with the subject of fermentation, and is well-nigh indispensable in bread-making, and for that reasons its manufacture is becoming more and more important. The generations of bakers that have gone over to the great majority were dependent upon the various brewing and distilling establishments at home and abroad for the yeast they used in bread-making, or from their domestic brews; but the limited and risky nature of the supply, and also the fact that the yeast so obtained was, as it were, only the refuse of these breweries, and not manufactured purposely for the baking trade, led to the growing of a yeast especially to meet the requirements of bread-makers, and yeast manufacturers generally are to be congratulated upon having accomplished an important improvement in yeast growing.

It is necessary to remember that yeast may be inherently bad when its cells are weak or old, or it may be bad through the presence of foreign impurities, or it may become bad in keeping. In the event of its having become feeble, it may be greatly assisted by *good nursing*, by gentle warmth, and by suitable nourishment, such as a little added malt extract or sugar.

In making choice of yeast, it will not do to be governed entirely by the reports of specialists who write testimonials, because they do not—nor should they—publish comparative tests, without which it is impossible to accurately ascertain the *relative* values of different kinds of yeast. The testimonials may state that the yeast submitted to microscopical examination, or to a baking test, was very good, or contrariwise; further than that it cannot *fairly* go, but this, however, does not prove that this particular yeast is better value for money than the yeast we may be using, nor will it do to be governed by such statements as, "The size of loaves was good, flavour excellent, the pile glossy, and bloom good." This description does not convey a correct idea by any means, and would apply with far greater accuracy to the *quality* of the flour, and not to that of the yeast. There are flours that would not answer to this description in any one particular, whatever kind of yeast had been used by the baker. On the contrary, there are flours that would turn out such bread, though a very inferior yeast had been used in its make up. Therefore, such statements prove very little. Yeast is only good or bad relatively, by comparison with a better or worse, as indeed are all other things. That is to say, there is no fixed standard to judge yeast by; the safest and only way is to judge it by comparison, and to prove that it is relatively bad or good, by *testing* with a better or worse yeast.

What is Yeast, and How is it Reproduced?

This is a question of importance to the baker, and I trust the answer will stimulate his desire to know more about it. The yeast used by bakers and brewers belongs to a cultivated species, having the accepted botanical name of *Saccharomyces Cerevisæ*. It is composed of round or oval cells like bladders. When a single cell is separted from the bulk, and examined with the aid of a microscope ($\frac{1}{12}$ objective) to determine its structural properties, it is seen to be composed of an outer wall or envelope, having no opening of any kind. This envelope is filled with an albuminous substance called protoplasm. In this protoplasm is seen small holes—called vacuoles—and specks which are also said by some to be nuclear elements, and by others to be spores and young cells of yeast. Other forms of life will be seen along with dead matter scattered about amongst the yeast cells. When this cell is placed in a proper medium it reproduces itself. A swelling forms upon the outside of the cell, this increases in size, and in a short time becomes like the parent cell. This protuberance gradually becomes detached, and is then a separate cell which, in its turn, produces other cells as soon as it attains its full size. Each cell usually produces about four other cells and multiplies very rapidly. This is reproduction by budding. Another view is that "when yeast is placed in a ferment tub, or into a sponge or dough, it is then in a state of full ripeness. The cells are mostly old, large, and have from one to twenty-four of these granular bodies or spores within each. When diffused through a ferment, sponge, or dough, the young spores or cells inside the old cells dissolve the envelope of cellulose which encloses them, and escape for a free and independent life. Thus each old ripe cell dies in giving birth to, on an average, eight young cells. These young cells develop quickly, and, if in a fluid medium, begin to throw off buds. In sponge the budding is less, and in dough there is very little budding.

There appears to be no doubt that yeast is a living organism. The generally accepted belief is that is a plant, and is closely allied to the fungi tribe. It is said that yeast is a plant, because it has no opening, and this is distinctive of a vegetable cell, and it also sprouts, assimilates mineral matter as a plant. Further, it cannot be a mineral, because it lives, grows, and reproduces itself when fed upon proper food, and decays and dies without it. On the other side, it is argued that there are other organisms, admittedly animal, which have the same continuous envelope, without an aperture; and further, that yeast cannot obtain the whole of its food from inorganic compounds; and in this respect it differs from green plant life. It is therefore like the great group

of fungi, but in the mode of its nutrition it also approaches to that of animals.

Yeast having no mouth *ingests* or draws its food through the cellulose which composes the walls of its cells, and therefore its nourishment must be of crystallizable nature, such as sugar and amides in solution; these pass inside easily, while starch in solution, or undissolved, or gluten in solution, will not do so until the starch has been converted into sugar and the gluten into amides.

Yeast both rises to the surface and subsides to the bottom of a fermenting liquid. The scum and dregs of this process were first examined by the microscope in the latter part of the seventeenth century, by Leuvenhock, who found that they consisted of minute particles of a definite shape, ranging in size from $\frac{1}{2000}$ to $\frac{1}{7000}$ of an inch in length. Cagniard de la Tour and Schwann, in 1835, a century later, made the remarkable discovery that these particles were living, growing, and multiplying, their multiplication taking place at a prodigious rate, by a process of budding. An Italian chemist, Fabroni, discovered the nature of oval yeast particles to be that of cells, composed of a special variety of cellulose, and containing fluid matter, consisting of the elements carbon, hydrogen, oxygen, and nitrogen, in the form of an albuminous substance.

Van Helmont, a Dutch chemist, so far back as the commencement of the sixteenth century, recognised the gas evolved during fermentation as identical with such as is found in caves, wells, and cellars. Lavoisier examined the change produced in sugar by fermentation, and proved that nearly the whole weight of the sugar is represented by the sum of the weights of the alcohol and of the carbonic acid produced. In accordance with this fact, we say that the sugar is resolved into alcohol and carbonic acid. The part that the yeast plays in this change was undetermined until the year 1845, when Von Helmholtz discovered that it is the living yeast-cell, or at any rate something inside the cell, which is the active ferment. It is a well-established fact, which no one now can call in question, that the chemical and physical phenomena already mentioned, namely, the resolution of sugar into carbonic acid and alcohol, and the upheaval or foaming of the mass, are intimately connected in some way or other with the life of a minute cellular fungus. When the life of the cells is destroyed by poison, the act of fermentation ceases. When the life of the cells is active by reason of a genial warmth, the presence of mineral food, albuminous matter, and sugar, then fermentation is briskly carried on. By the addition of a very small quantity of yeast to wort, a multitude of living cells are introduced into a liquid medium adapted in the highest degree to their nutrition,

and they are thus capable of vegetating with most extraordinary rapidity.

The process of budding usually commences by a distortion of the cell at one side, which is followed by the cell-wall protruding; the protuberance, increasing in size, becomes more or less rounded in shape; then a sort of strangulation process commences, which causes the cell-walls of the protuberance to meet, and at last the bud becomes detached. Sometimes a cell gives rise to several protuberances at once.

If we examine a speck of yeast under the microscope with a high magnifying power, we observe that certain of the cells are more or less elongated, while others are more nearly spherical in shape, and they are all isolated. In many of them there are apparently vacant spaces which are lighter or darker than the surrounding parts of the cell according as the object or the object-glass is slightly shifted. Granulations, too, are seen in the cells, and they present altogether a somewhat shrivelled appearance, or sometimes they string together like small sausages, cannibal-like living upon each other. Such cells are suffering from deficient nutrition and insufficiency of food; they are, in fact, half starved. If they be transferred to some fresh wort, and placed in shallow vessels so that they are freely exposed to the air, their appearance will be greatly improved. They will be seen to have filled out and become fatter, while the vacuoles or vacant spaces have disappeared, the granulations are scarcely visible, and the distended cell-walls are difficult to see, they are nearly all budding, and the buds are at different stages of development. The characters of the two conditions of yeast may be shortly summed up as follows:

Old Cells.—Isolation and granulation; shrinking of the protoplasm to the cell-wall and creation of vacuoles; shrivelled appearance.

Revived Cells.—Cells distended; appear transparent to a greater degree; budding and growth of buds until detachment; interior gelatinous matter contains fine granulations not easily seen, but appearing brilliant at a certain distance.

Brewers are acquainted with two varieties of yeast and two processes of fermentation, namely, that which occurs at a high temperature, and the yeast of which rises to the surface of the liquid, is called a "high fermentation"; that which, on the contrary, is conducted at a low temperature, and the yeast of which is below the surface of the liquid, is called a "low fermentation." With all our brewers and distillers high fermentation is in universal favour, it is so much more rapid in its action, and generally saves both time and space. To adopt the process of low fermentation in a

brewery would probably necessitate a large outlay for the extension of premises for the storing of beer while undergoing the prolonged process. This latter mode of fermentation is in operation at lager-beer breweries, specially built for the process. Both the high and low yeasts are the products of careful cultivation, extending through past ages, the original and parent form of which was probably some variety of fungus growing upon either the hop or grape vine.

Low Yeast.—This may be appropriately termed German beer yeast, since it is almost entirely used in the brewing of lager beer.

The cellules are round or oval in their greatest diameter. It ferments wort at temperatures as low as (6° to 10° C.) 43° to 50° F.; under such cold wort other yeast is not so active. It never rises to the surface, even when the temperature increases to (20° C.) 68° F., and the fermentation becomes tumultuous. Its budding is less branched than is the case with high yeast.

High Yeast.—The cells are rather larger than those of the low ferment, and present a more globular appearance. Its budding is very rapid and more branched in form. It rises to the surface of liquids during fermentation, forming a head sometimes 6 feet in height. It develops at (16° to 20° C.) 60° to 68° F.; at low temperatures it is not so active. When active fermentation takes place, in round or oval vats, the yeast rises upwards from the bottom at the circumference, and travels over towards the centre. The smell of acetic ether is generally perceptible in the gas which escapes. High and low yeast may be obtained by cultivation under favourable conditions from opposite varieties, and they belong to the same species, *saccharomyces cerevisiæ*.

As yeast is a plant of low organization, it is necessary to supply it with the mineral and organic material such as will contribute to the formation of fresh tissues during reproduction and development. To ascertain what these are, we must turn to chemical analysis for our knowledge.

Purified yeast contains:

Carbon	49·9	per cent.
Hydrogen	6·5	„
Nitrogen	12·1	„
Oxygen	31·4	„
Ash	2·5	„

And consists of:

Cellulose, gum, and cell-membrance	37	per cent.
Albuminoids	45	„
Peptones	2	„
Fat	5	„
Extractives (leucine, dextrin, glycerine, succinic acid)	4	„
Ash	7	„

It will be seen that nitrogen is a very important element, and nitrogenous matters must be a necessary form of nutriment for yeast; for the fermentation of solutions containing a deficiency of such material, leguminous seeds, such as beans, should be steamed, and the mash so prepared be added to that about to undergo fermentation. The reason for this proposal lies in the fact that the leguminosæ are rich in a nitrogenous substance called asparagin, which has been found to be an excellent nutritive material for the yeast plant. Its composition is $C_4H_8N_2O_3$; it is closely related to malic acid, as likewise is aspartic acid—$C_2H_3(OH)\,(CO\,OH)_2$.

It is a well-known fact that yeast can derive its nitrogen and carbon from ammonia salts of organic acids, as, for instance, ammonium tartrate.

The use of pure and healthy yeast is a condition of the very highest importance, but one which has been too much neglected by bakers, brewers, and distillers.

There are several kinds of yeast which produce alcohol during fermentation, they are named as fallows:

1.	Saccharomyces	Cerevisiæ	(Bakers)
2.	"	Ellipsoideus	
3.	"	Conglomeratus	
4.	"	Exiginus	
5.	"	Pastorianus	
6.	"	Minor	
7.	"	Mycoderma	

The species No. 6 is found in fermenting dough (found in the typical Scotch bread). No. 7 only acts as an alcoholic ferment under special conditions.

Some organisms can oxidize alcohol into acetic acid; the *Bacillus amylobacter*, and the *Bacillus subtilis*, yield lactic and butyric acids from even cellulose, starch and sugar. *Mucor mucedo*, *Mucor stolonifer*, and *Penicillium glaucum* are common forms of mouldiness; the presence of the former, which are named *bacteria*, or rod-like organisms, cannot be recognised without the aid of a microscope.

There are other kinds of yeast besides those used by bakers and brewers. The name of yeast is also given to a number of what may be termed wild or uncultivated types of fungi and other tiny organisms that can act as yeast and produce carbonic acid and alcohol from sugar, but an important difference exists between the shape and appearance as well as the character of these yeasts as compared with what is called bakers' yeast, just as there is a great difference between a wild crab-apple and a beautiful rosy pippin. This *saccharomyces cerevisiæ* used in baking is a highly cultivated yeast, and is the result of a continuous

effort on the part of the yeast cultivator to produce a yeast as free as possible from any admixture of these wild types and other disease germs.

The disease-organisms are small rod-like, or thread-like bodies, and much smaller in size than the yeast-cells, and more difficult to observe, so that a magnifying power of not less than 400 diameters, with glasses capable of the best definition, are necessary. It is better to employ objectives with a magnifying power of 750 to 1,000 diameters. Were these disease-organisms absent, acetous fermentation could not take place.

Yeast-cells may be diseased without being putrid, and they may be unhealthy without being diseased.

Yeast may become unhealthy, even when not diseased, by being grown for too long a time in a liquid deficient in mineral food; fermentation is thus languid, and those objectionable organisms, the filamentous ferments, may gain the race in the production of alcohol or acid.

Damp yeast loses its activity at or about 128 degs. (Fahr.).

Cleanliness of the fermenting vessels is obviously of importance, because otherwise other ferments than the alcoholic may easily cling to the sides, and so induce an acid or putrid fermentation; this is particularly the case with *Bacterium termo*. On this account it is of importance to have the fermenting vessels constructed of some material which is easily cleansed.

Yeast may be inherently bad when its cells are faint or old, or it may be bad through the presence of foreign impurities, or it may become bad in keeping.

The Appearance of Weak, Exhausted, and Impure Yeast.

Referring to weak and exhausted compressed yeast, it looks dull and feels soft and sticky to the fingers, or breaks up into small warm crumbs, not breaking with a free, clean, fracture; the smell of it will not be that of sound acid fruit, such as apples, but that of tainted meat or flesh. If the yeast has been stored for a day or so, it will feel to the hands, and show by thermometer, warmer than the atmosphere where it has been stored. In proportion as it is warmer will it be bad. These are sure tests for soundness or unsoundness of yeast, and no microscope is needed. But to detect impurities and their nature involves microscopic work, and will require careful, watchful attention and practice. When looking at yeast through a microscope, if it is seen to have inside the cells a number of dark specks, and the outer skin has a crinkled, shrivelled appearance, it has become too exhausted to properly do its work; or if the yeast has scattered amongst its cells a number of organisms like short pieces of thread

or other germs, not round or oval, which is the shape of the true yeast, it is then unfit for bread-making, and contains impurities in the shape of bacterial organisms, that the brewer or distiller by careless workmanship has permitted to get in it from the air and from unclean utensils. The ordinary common-place collector of yeast in the brewery is unmindful of the baker's need, he merely collects so much weight, that will fetch his firm so much per pound; the baker's safest plan is to have nothing to do with him, but buy only high-class yeasts. If compelled to use faint or impure yeast—*because you cannot get any other*—use nearly double the quantity of yeast, and don't expect too much work from it; be content with small sweet bread, obtained from a quick fermentation at a temperature of about 90 degs. (Fahr).

It must be as true of yeast as of all other life, that there is a condition of growth more suitable to it than any other. Ascertain, therefore, what are the most suitable surroundings for healthy yeast life and reproduction, and then never depart from these conditions, whatever the pressure. The one great reason for this is, that science and observation both endorse the statement that, as soon as a medium becomes *unhealthy* for yeast, it becomes *healthy* for the growth of one or the other of the disease germs, and that these germs lie dormant when the conditions are opposed to their activity, and even when they may live in these unsuitable conditions, their growth and reproduction is nothing worth noticing; but when the conditions are favourable, they are then set completely free and multiply very quickly. This is as true of lactic and butyric germs as it is of all kinds of yeast. Every form of life has its sphere and food. Neither moths, mushrooms, nor flies will germinate in brine, or quicklime, and though they may pre-exist in some form, they must have a medium as a matrix in which to develop and reproduce their species. The cheese affords a matrix for the cheese-mite, or it would remain undeveloped and devoid of a means to mature and reproduce itself. This is the great truth I would have you learn. No matter how low we descend, it still holds good through all forms of microbic life the same. In just so much as these microbes differ in their nature, so much will they differ in the suitability of the medium of their sustenance and life. A smelt and a tadpole will not thrive equally in the same surroundings, therefore ascertain the physical laws governing the healthy reproduction of yeast life, obey the rules that law lays down, and you will be quite free from the effects of other foreign germs.

Before yeast can obtain any food from flour, the flour must be made into a thin paste, as already shown; yeast cannot assimilate dry or solid food. There must also be a certain amount of heat. In a baker's ferment or sponge both these conditions are

present. The flour is stirred into warm water, which dissolves out the sugar and soluble albuminoids. The yeast commences to act upon these, and, with the aid of a natural principle, like human gastric juice, within itself, it proceeds to use the natural sugar in the flour, and to alter these soluble albuminoids and the starch into sweet substances or amides. These are its natural foods, which it assimilates from the sponge. It absorbs these substances into its own elements, and gives off carbonic acid gas and achohol.

Note.—There is practically no alcohol formed in the earlier stages or until the free air or oxygen of the sponge or dough is exhausted, and by taking a rapid sponge in first turn, or doughing direct and turning the dough often, there will be plenty of free oxygen present and very little alcohol. You know the feel of well-aërated, well-made dough. This making and turning, or "heading" up, saturates it with free oxygen. Alcohol is a poison to the yeast. The evolution of gas and alcohol is in proportion to the amount of nourishment it has been able to absorb. There is also a series of other changes going on during bread fermentation. The heat and the moisture are also acting upon the insoluble albuminoids of the flour, disuniting, changing, and degrading. During the whole operation the yeast will, while retaining its vigour, continue to seek out and digest the mineral and nitrogenous matters it needs or can get at.

Types of Yeast.

Beer Yeast is collected from a number of picked breweries in London and the provinces, the various brews thus collected being blended with a view to combining strength, uniformity, and security; but uniformity of action has not been attained, as this yeast is prone to grow faint, and sometimes to entirely collapse in hot weather.

Mode of Working. Put in a ferment with ⅛ of the total water at 84 degs., a handful of flour and some other yeast food, allowing one pint of yeast to every 140 lbs. of flour to be made up. Let this ferment until fermentation begins to subside, and then strain it into the trough and add half of the total water at a heat sufficient to bring the added flour up to 86 degs. Stir to a light spongy sponge, and allow to ferment six more hours, and until it has risen and subsided twice; then add the remaining half of water at a heat sufficient to bring the heat of dough up to 86 degs., and 3½ lbs. of salt; break the sponge and this added water up together quite smooth, and then make the whole into dough, which should rise for about two hours, and then be taken out of trough, scaled off, moulded and baked.

Brewers' compressed or dry Yeast is produced by evaporating the moisture of ordinary brewers' yeast, and compressing the residuum. It possesses the qualities of thick yeast, and is coming into greater favour every day, because the baker is handling a certain quantity of yeast in the dry, and a very uncertain quantity in the semi-liquid. Quantity to use: 6 ozs. to the bag of 140 lbs. Mode same as thick yeast.

Compound Barm, Comp., Compo., and Patent is the same yeast under different names. It is a malt and hop yeast, and is essentially a baker's home-made brew. In a few large towns there are compound barm or patent yeast brewers who make it in quantities and retail it out to bakers who do not want the trouble, or do not know how to make it. It is this wholesale manufacture of comp. that has ruined it. Of course it could not be made, carted, and delivered as cheap as the baker could make it himself, with no charge upon it for labour; and to compensate for these extra expenses the yeast brewer has drawn very freely from the water tank. The mode of making these malt and hop yeasts does not vary much throughout the United Kingdom, the chief variation being in the different quantities of malt and hops used to a given quantity of water.

Mode of Working. To make 140 lbs. flour with "Patent" "Compound Barm" yeast, use 3 pints, and proceed the same as for Brewers' yeast; but owing to the limited number of yeast cells usually present, this yeast requires a longer time in the various stages to permit of growth and multiplication, sufficient to enable it to do the work required: About eight hours in the ferment, eight hours in sponge, and three hours in dough, with two pounds of salt to the 140 lbs. flour, to keep down the growth of acid producing germs which are sure to be present in these long process fermentations, as well as to add flavour in the room of the natural flavour of the flour, which has been consumed by the yeast. The guiding principle in working this yeast is—plenty of time and plenty of salt.

How to Grow Malt and Hop Yeast.

In writing directions how to grow yeast for bakers' use, we have been mindful that there are others who make bread besides bakers, and there will be found in this work some household recipes for yeast growing. We have also been mindful that bakers do not always reside in cities and work in bakeries, sometimes they go to sea in ships, or dwell among the mountains, occasionally they march with armies, and in the explorers' company; and in many other places and ways have to make shift with a different

type of yeast to aerate their bread. It will, therefore, be useful to give with these directions a few examples of aerating agents that will ferment bread when yeast proper is not obtainable. For convenience, I will class them as yeasts.

General Principles to be observed when Growing Yeasts.

Never boil or scald the malt, because, like overdone meat, it will be hard to digest. Meat that has been much roasted or boiled is chemically changed, and resists the action of the digestive fluid. *Boiled* or *cooked malt* will not readily lend itself to assimilation with the other constituents of the brewing tub. It will require considerable digesting before doing much work, and the wort will be sluggish and dead;—150 to 170 deg. (Fahr.) is a good heat to mash malt, and quite sufficient to liberate or extract the principles required.

Hops should be boiled, but not allowed to stew; some bakers put them into the oven to stew for four or five hours. This is not wise; it causes a strong, rank flavour, let them boil for five minutes briskly, and then let them cool down to about 150 deg. (Fahr.) before pouring upon the malt.

Crushed malt is always to be preferred. Buy the best malt and hops; money will be saved, because they will make a stronger soil in which to grow yeast, and the danger of imperfect work will be avoided.

Be sparing in the use of water; the more water you use when growing yeast, the more yeast will have to be used in making bread, and, if so, where is the economy of using water too freely?

Important.—See that all utensils are well scalded with boiling water before using. Stale germs will probably set in motion lactic or other disease ferments, and spoil the brewing.

Patent Malt-and-Hop Store (or Compo) Yeast.

I. *Quantities.*—¼ lb. hops; 5 lbs. malt; 6 gals. water; 1 quart last store. Boil the hops with as much of the water as the vessel will allow of; boil at a gallop for five minutes, and then allow it to cool down to 150 degs. (Fahr.) by the thermometer; then pour it on to the malt in a tub, occasionally give it a good stir up with a stick, and when cooled to 75 degs. (Fahr.) by the glass (no guesswork here,) add a quart of yeast from the last brewing, stir up and strain into a flat tub, large enough to allow for fermenting. Let the wort ferment for thirty hours; it will then be ready for use. One pint will ferment one bushel of flour.

II. *Quantities.*—10 gals. water; ½ lb. hops; boil quickly for five minutes; cool to 150 degs. (Fahr.), then mix with it 10 lbs. malt, stir well, and allow to remain in the mash two hours, then

strain. If possible, when straining, fasten the sieve as high as convenient above the tub, say about a foot, this will aerate and cool the liquor as it falls; when cooled to 75 degs. (Fahr.) put a ¼ lb. pure compressed, stir up, let it ferment about thirty hours. One pint to the bushel.

III.—Boil for a few minutes as many hops as you can hold in your hand in 6 quarts of water. Let them cool for ten minutes, then pour the mixture upon 2 lbs. malt; let them mash an hour. It will then be cool enough to receive ½ pint brewer's yeast. Stir this in briskly, strain into a tub, and leave to ferment about twenty-four hours.

Good yeast is made by using ¼ oz. of hops, ¼ oz. dried yeast, ⅛ oz. salt, and ½ lb. of crushed or ground malt to every quart of water. The principle of brewing this yeast is the same for all quantities, namely, boil the hops in the water for five minutes, let it cool to 160 degs. (Fahr.), stir in the malt, and let it stand covered up for three hours, then strain and squeeze all the liquor out, and let the liquor cool quickly to 70 degs. (Fahr.). Mix in the yeast and the salt, and let it work for twenty-four hours, it is then ready for use. You may use more water than the quantity named, but then you will have to use more yeast, and with this further drawback, that, having a larger quantity of liquid, you will have a larger quantity of bacteria, simply because you have a larger space to collect them in. For example, assuming that most of these germs get into the yeast during the process of manufacture, it is reasonable to suppose that a surface of twelve inches square will catch more of them than a surface only half the size.

Flour Barm.

Quantities.—3½ lbs. malt; 3 ozs. hops; 2 ozs. salt; 2 ozs. sugar; 4 gals. boiling water; and 8 lbs. flour. Put the malt into a large tub to allow for working, and pour upon it 1 gal. water, as hot as it is possible for you to bear your hand in, or 150 degs. (Fahr.) by the glass, let this mash one and a half hours; also pour upon the hops 2 quarts *boiling* water, and let them mash. At the end of that time mix them together and strain; then stir in another tub about 8 lbs. flour, and a little warm water to mix it clear, then have an assistant with a stick to stir continually and rapidly, while you pour in from 10 to 12 quarts boiling water; take turns about with the stirring for about five minutes, let cool to 170 degs., and then mix with the malt and hops. Leave this to ferment, exposed to the air twenty-four hours; then stir into it 2 ozs. sugar, 2 ozs. salt, ½ lb. of flour, 1 oz. distiller's yeast, and place the tub uncovered in a sheltered place, where it will be comfortably warm. If in ten hours it is working freely, and full of life, leave it alone; but if

sluggish and dark-looking, dip your half-gallon measure down to the bottom, bring it up full, lift it about a foot above the tub, and pour it slowly back ; do it twice or thrice ; this will let some air into its lungs, and help it to breathe more freely. Let it ferment two days before using. According to the state of the weather it will be necessary to move the tub into a warm or cool place. You should endeavour to keep it at about 78 degs. (Fahr.).

Parisian Barm.

Quantities.—4 lbs. malt ; ¼ lb. hops ; 4 gals. boiling water ; 2 quarts last brewing ; 8 lbs. flour. Mash the malt in a large tub by pouring upon it 1 gal. water, 150 degs. (Fahr.). Pour upon the hops 2 quarts boiling water, and let them mash for about an hour or so ; then strain the hops ; stir in 8 lbs. of flour, and stir vigorously while 10 to 12 quarts of boiling water are poured into it to make a scald ; stir for a few minutes. When cooled to 76 degs., stir into it 2 quarts old barm ; or, if you have not previously made this kind, and have no old flour barm, use 1 quart of malt-and-hops yeast ; stir this up, and let it ferment about twenty to forty hours. It is recommended to scald the flour in another tub, and let cool to 150 degs. before adding malt and hops.

Flour used in the place of malt.—Boil 2 ozs. hops in 2 quarts of water a few minutes. Strain it, boiling, upon ½ lb. flour. Stir up, and when as cool as new milk, put into it ½ pint brewer's or malt-and-hops yeast ; stir, and allow to ferment thirty hours, and it will be ready for use. Bottle a pint to use in the next store, instead of the brewer's yeast.

Yeast without Seed Yeast to start it.

This is a suitable recipe for growing yeast without the aid of any added yeast to start it, and will form a foundation store from which a quart or so should be taken as soon as it is ready ; bottle and closely cork.

Quantities.—½ lb. hops ; 2 ozs. sugar ; 10 quarts water, boiled for five minutes, cooled to 150 degs. (Fahr.). Stir in 5 lbs. malt ; allow it to mash thirty minutes ; strain ; let it cool to, and keep it at, 80 degs. (Fahr.) as nearly as you can. In 60 hours it will be ready for bottling. Don't cork for 24 hours.

Handy Stop-gap Yeasts

When malt-and-hops and other yeasts are not obtainable ; suitable for the housewife, and others who use only a small quantity of yeast.

I.—Boil ¼ lb. flour and 2 ozs. sugar in 4 quarts water; let it cool to blood heat. Add ½ gill of brewer's yeast, or 1 oz. dried, put into a vessel to ferment for two days, bottle and keep in a cool place. Keep a pint of this for the next brewing, and use in place of the brewer's yeast, if that is not obtainable.

II.—Boil ¼ lb. hops in 4 quarts water for five minutes. Strain, and let it cool to blood heat, nicely warm but not hot; put into it 1 oz. salt, 1 lb. sugar, and 2 lbs. flour, mix well together and put in a pan to ferment for three days. Then stir into it 2 lbs. boiled and mashed potatoes, and let the mixture ferment another twenty-four hours, or more. This is an excellent yeast, and used as a flour barm without a ferment makes capital bread. To make up 1 peck of flour, put in a sponge with 1 oz. salt, 1 pint of this yeast, half of the flour and enough warm water to make it into a batter; let this sponge ferment for ten hours; then add 2 ozs. more salt, powdered, and with the rest of the flour and a little warm water make it into a firm dough. (Don't use too much water and "wet the miller's eye.") Let this dough prove for 1 hour, then mould into loaves, which should be allowed to prove a short time before being put into the oven.

To Keep Yeast Fresh.

All compressed yeasts should be kept in a close firm mass: crumbs should be slightly sprinkled with cold water and lightly worked into a lump. Keep dry and cold, and free from air. Like all life, when age overtakes it, decay soon sets in. Do not keep in a refrigerator with ice in summer, nor too near the fire in winter; neither freeze nor scorch. In hot weather damp the dried yeasts, and pack closely in a pan or jar, tie up and bury in sand or earth; brewer's and malt-and-hop yeasts put in bottles, cork, and serve ditto.

Paper and canvas parcels, as soon as they arrive by rail or parcels post, should be dipped into cold water a second, and then put in a cold cellar; when absolutely necessary to keep it some time, it is a very good plan to half fill a pan, cover with cold water, and then bury the pan up to the top in a cool corner of the garden; put a board over the top.

To Strengthen and Revive Old or Weak Yeast.

If you cannot by any means get better—mix 1 oz. of malt extract with a quart of water 70 deg. Fahr., and a quart, or ½ lb., of yeast. Stir all together and let it stand for twelve hours, use then in the ordinary way, counting only the yeast in your measurement, and not the water.

To Cleanse Bitter Brewer's Yeast.

Put it into a pan and pour on it some cold water, stir it gently and let it settle for a few hours. The yeast will sink to the bottom, and the water can be poured off, which will carry off most of the coarse flavour of the hops and colouring matter, etc.

Compressed, Distiller's and "Dried" Yeasts are the result of a special effort of modern skill and enterprise to make a yeast specially for bakers. And without doubt these yeasts are a most decided improvement upon all the other kinds hitherto used in bread-making, combining, as they do, vigour of work with certainty of action. The chief difference between distiller's yeast and brewer's yeast consists in the fact that the yeast of the brewery is obtained when brewing malt liquors,—ale, beer, stout—and the yeast is necessarily coloured and flavoured by that of the beer from which it is taken, pale amber, light or dark brown, bitter, &c.; the product of the distillery, on the other hand, is free from added colouring and flavouring matters at the stage when the yeast is formed and taken from it, the fermented wort being for distillation into spirit, and not for drinking, as in the case of the wort for beer. This is also the reason why distiller's compressed is much whiter than brewer's compressed.

The distiller allows fermentation to proceed until the whole of the saccharine in the liquid is turned into alcohol, the carbonic acid also passing away. When fermentation has stopped, the wort is removed to the wash charger, and thence to the still—a copper boiler with closed head—to which is attached a copper pipe called the worm, descending through a large tub filled with cold water in constant circulation. Fire and steam applied to the still cause the contents to boil, the vapour arising therefrom passes through the worm, and is, consequently, condensed, issuing from the end of the worm as a liquid known in the distillery as "Low wines." This is redistilled, and it is here, if anywhere, that the colouring and flavouring matter is added; but in the case of malt liquors these things—hops, quassia, burnt sugar, &c.,—are put into the wort during the actual fermentation, and must, therefore, be more or less in or on the yeast.

Comparative Equivalent Strength of Yeasts.

One pound of distiller's dried yeast will be equal to five pints of brewer's thick, and eight quarts of comp. (patent). Some of the liquid yeasts are so very liquid that it is difficult to form any estimate of their strength. The percentage of yeast-cells in them is very low indeed. Bakers were soon educated to appreciate the gain in purchasing a crop ready grown over the old mode of buying and planting a few seeds, and growing crops from them.

This is a beneficial change for the baker, and means reducing a sixteen hours' preparation to eight—a great advantage to a man who has to bear, through the whole time, the enormous strain that is attendant upon bread-making.

ABOUT FERMENTATION.

FERMENTATION is a change, a splitting up of matter with the formation of new subjects by living organisms called "ferments." The word fermentation refers alone to the action of these organisms. Fermentation is the effect; these living organisms, called ferments, the cause. Observe also that there are many kinds of ferments, most of which would not be at all suitable for bread-making. Fermentation, with its dependence on microbic life, is a subject of far-reaching interest; the better understanding of it will help doctors to cure diseases which now seem incurable.

I will, in a sentence or two, describe with somewhat more of detail what is usually meant by the term.

Fermentation is the name given to a class of decomposition undergone by a number of organic bodies in the presence of certain organized bodies of extreme minuteness termed ferments. All the kinds of fermentation at present known depend upon the existence and growth of minute organisms—these are the ferments; alcoholic fermentation is the change which sugar and other crystallisable substances undergo when subjected to the influences of a ferment such as yeast; whereby the sugar, &c., is converted into alcohol and carbonic acid gas.

There are also formed small quantities of succinic acid and glycerine; the yeast also uses a fraction of the sugar and the crystallisable substances to build up its own structure. It is also said that the fermentation takes place at the moment when the cells of yeast cease to have power to freely consume the materials of their nutrition by the absorption of free oxygen or common air, and continue to live by utilizing matter containing oxygen, which, like sugar or such other unstable substances, break up and produce heat by their decomposition. The living organisms develop living force by taking it from the oxygen and transforming it, or from the sugar splitting it up and forming from it carbonic acid, alcohol, and other bye-products.

In most minds the words putrefaction and fermentation are regarded as different and distinct from each other, but that is not so. Putrefaction is merely a form of fermentation. The change which produces carbonic acid gas from saccharine matter is termed fermentation. The change which produces sulphur compounds, &c., in decaying animal bodies, such as

eggs, is called putrefaction; but the chemical operation of both is of the same kind, and consists of the resolution—the changing of complex bodies into simpler forms by organisms setting up fermentation. Bacterium lactis is the ferment which makes lactic acid, Mycodermic Vini makes acetic acid, Bacillus Subtillus makes butyric acid, Bacterium Termo is the putrefactive ferment, &c., &c., and most of these fermentations are going on in well fermented dough, when it becomes over ripe and past maturity. The more the subject is investigated, whether as regards leavening, or any other process of fermentation, the more clearly it will be established that the only true system of bread-making hinges on the principle of fermentation by means of pure sound yeast; and the quantity of that yeast must be governed by the style of work in hand.

SUGAR.

THERE are several kinds of sugar, but only three which concern us or commerce generally, viz., cane sugar, (saccharose), grape sugar (glucose dextrose), and what is called fruit sugar (Lævulose). Cane sugar occurs in a large number of plants, but commercially is only manufactured from sugar cane, sugar beet, sugar maple, and sorghum, one of the palm tree tribe.

Sometimes it is said that sugar made from the sugar cane is sweeter than that made from the sugar beet, but this cannot be so. From necessity, cane sugar, from wherever obtained, is absolutely the same substance, and if prepared equally pure and as well refined, has the same sweetening power. It, like all the cane sugars, is composed of the elements of C (carbon), H (hydrogen), and O (oxygen). These are united in the following proportions: $C_{12}H_{22}O_{11}$ as its formula. Before passing to cane sugar, its manufacture and refining and testing, I will dismiss the grape sugars in a sentence or two. (They are so frequently dealt with in the articles upon bread-making in this book.) Cane sugar when heated in a solution with dilute acids, or when submitted to the action of yeast and other ferments, takes up the elements of water (H_2O), and splits into two molecules of grape sugar, viz., dextrose, so named because it has a right-handed power for polarized light, and Lævulose, which is Lævo-rotatory. Both of these have the same formula, $C_6H_{12}O_6$, but differ in their properties, doubtless owing to a different arrangement of the atoms or groups of ultimate particles of which the respective molecules consist. Starch also, when acted upon in the same manner, yields glucose, a grape sugar, and identical with dextrose. These grape sugars are also called invert sugars because

they invert the order of the rotatory action of the original cane sugar. (*See polarization.*)

A short description of the manufacture of sugar will be useful knowledge in helping us to understand more about this important member of our raw material family. There are four processes in the preparation of the ordinary commercial sugar—extraction of the juice, clarification and defecation, refining, and crystallization. The sugar exists in the cells in a state of solution in the fluid which constitutes the juice or sap of the plant; this juice is extracted by pressure, by mill or press. This crude juice contains, besides sugar, water, earthy insoluble matter, albumen, wax, soluble colouring matter, and soluble salts. To prevent fermentation, the defecation process follows as quickly as possible after the expression of the juice. This is by defecating the juice with slaked lime or mono-sulphite of lime made into a cream, and added until the acids, acetic and lactic, in the sugar have been neutralized, then heat is applied, and when the process is completed (first by filtration and then by defecation) the juice is tapped off, and is then refined by allowing it to percolate through animal charcoal, which cleanses it from the colouring and other soluble organic matter. It is then evaporated by means of a vacuum pan, and caused to separate into crystals; the mother liquor that is left is drained off. When large grains are wanted for the market in the form of white crystals, the mass is put into a revolving perforated basket and the centrifugal force due to rotation forces the loose syrup through perforations, while the large solid grains remain behind.

The first running of syrup from the first crop of crystals is reboiled and sometimes refiltered through the charcoal, and more crystals are formed, and this is carried on through second and third or more runnings, until the last syrup is so poor in sugar that difficulty is found in getting it to crystallize any more, and this final residue is the treacle and syrup of commerce.

This is a rough outline of a process (there are several modifications) much more complicated than roller flour milling, and I have touched upon it chiefly for the purpose of pointing out that every succeeding formation after the first and second must be of a weaker and lower grade, and with the near approach to a certainty of there being some glucose in it, because after the length of time the operation has been in progress inversion will be caused by something, and whenever glucose is present the sugar is weaker in saccharine, and will also more easily decompose when being made up into goods, and the further also that these processes are carried on the more certainty there is of discolourizing by contact with vessels in which it is carried on. These lower grades

are characterized by more dust or powder, or these and small uneven crystals mixed in, and the whole "blued" like you blue your Icing sugar, merely to add to its *apparent whiteness.* In using such sugar for fondant or boiled sugar goods is unreason, for the added mineral matter will have to be skimmed off as scum, and the glucose mislead by changing at a lower temperature than the best sugar, but it must be observed that it is possible to buy highly saccharine sugars in a very impure condition. The char and the blood that are used to take out the colouring impurities also leave behind them some of their own compounds, and these have to be refined out as well, and sometimes this is not done perfectly. When choosing sugar select an evenness of crystals (not large and small and dust) with the palest shadow of brown, not a blue tinge.

Tests for purity and commercial value. For mineral matter and imperfect refinement, put 25 grams into a 100 c.c. graduated measure, shake occasionally till all the sugar is solved if well refined, colourless or but slightly cloudy—the imperfect, "yellow" brown, or nearly black, let remain undisturbed for 12 hours for mineral matter to deposit itself, and then read off the percentage. Test for glucose, simple and reliable. See Dr. Barker-Smith's test in this book.

Test for moisture. Weigh off 5 grams, place in a well dried platinum dish, or one that will not break—but first carefully weigh the dish—place in oven at 140 deg. Fahr., and leave to dry for 12 hours, then weigh again, the loss in weight calculate as water.

Estimation of ash. Take the same quantity, moisten it all over with water, and then with pure sulphuric acid, heat this gently until frothing ceases, and then continue to burn to redness, take off gas or out of the heated chamber, and moisten the sugar a second time with sulphuric, and let it burn again until the ash is quite white, then cool down and carefully weigh.

Confectioners' Caution. The sugars which were sold 25 years ago as common whitish dull looking moist, and called "pieces" by dealers is that sugar to-day which we buy as dead looking castor, or powdered white sugars without a single sparkle in it. Beware of non-sparkling sugar. Science has whitened, but not enriched it. Like flour it is safer to buy coarse granulation rather than fine. Crystals are usually better than powder, though for some things, such as Icing, a fine powder is necessary. But powdered sugar should always be looked upon suspiciously; it is not capable of a high form of crystallization, and is mostly the re-refined refuse product of high-class sugars; and therefore pulverized sugar is unsafe to buy for best goods.

BUTTER AND FATS.

Simple Tests for Purity. Weigh 10 grams, and put in a graduated test tube and melt by placing the tube in hot water, after a time the water and curd casein and the true butter separate into layers; the water remains lowest. The percentages of these can be read off in the tube. There should be not more than 10 per cent. water, nor exceed in volume more than $\frac{1}{8}$ of the pieces put in. The curd should not be more than 5 per cent.

If butter has been mixed with much other fat it will not froth, or only a very little. Place pure butter in a test tube or thin glass, and hold it over a gas jet, when it will froth: the more and easier the less water and salt there is in it. Place margarine in a test tube, and heat, it froths but little unless its butter percentage is high, but deposits its caseine (if milk is used) and added matter, etc., which form at the bottom as dross, and can be estimated. Animal and vegetable fats melt, and remain as clear oil. Rub margarine and fats violently in your hands, and smell. Place a piece of candle wick in fat, and a piece in sweet butter, then set them alight, the fat will smell more or less tallowy, and the butter, buttery. *Try lard* the same way, the coarser and staler the worse smell.

Lard is sometimes adulterated with cotton seed oil. Put a piece into a porcelain dish, and make very hot over bunsen, and its smell will disclose its presence; this test is useful for most fats, heat separates, and the odour is plain.

Eggs. Spots are caused by laying in one position a long time, therefore unpack and repack if necessary. The value of an egg is determined by its weight and freshness, breed of the fowl, and whether pickled or not. Pickling impoverishes the albumen. To the baker, an extra egg to the pound represents nine pence worth to the 120. Weigh eggs for your mixtures, do not count them. A beaten egg can only aerate and lift its own weight of flour; any mixture containing more weight of flour than eggs must have other aerating agents added, or it will be heavy.

Gelatine. Coarse or fine, or sheet, should be tested each in the same way. Melt it and make hot, and the nearer it approaches to glue or size in smell or taste, the worse it is: glue being the extreme boundary of badness, and isinglass the extreme boundary of goodness. Bad gelatine makes goods taste tainted.

Chocolates for bakers should be pure and unsweetened, and melt like butter when put into heat without admixture of water.

Cheap chocolates are mixed with lower grade cocoas, farina, sugar, etc., making goods coarse and of poor flavour.

Dessicated Cocoanut. Buy it unsweetened. Sugar costs 100 per cent. less, therefore add it yourself.

Cream of Tartar ($K\ HC_4H_4O_6$) is a concrete saline, which separates from wines after full fermentation, encrusting sides of vessels with whitish grey and red crystals. The quality of it depends upon the amount of refinement it undergoes by filtration and crystallization. The crude crystal is purified, and the value of the product depends largely upon the amount of impurity taken out or left in. Like flour, sugar, cloth, and hundreds of other things, cream of tartar depends for its quality upon the amount of money and labour expended upon its purifying process. It dissolves very slowly, and therefore the gas evolved in the goods goes on until the goods in the oven are nearly baked.

Tartaric Acid ($H_2C_4H_4O_6$) is also another grape acid deposited from wine. It occurs in the form of acid tartrate of potash. It is very quickly dissolved when in presence of moisture.

Citric Acid is separated mostly as an article of commerce from lemons. It is also found in many fruits, gooseberries, etc. It is a vegetable acid like tartaric. Citric is a very wholesome acid.

Acetic Acid ($C_2H_3O_2H$) is a constituent of many organic bodies, and is one of the results of the decomposition and oxidation of almost all organic substances.

The acetification of fermented matter—matter which has undergone vinous fermentation, and wherein alcoholic fermentation has occurred—is readily attained by an exposure to the air of the fermentations at a slightly elevated temperature.

There are two potent factors at work upon these fermented matters to produce this acetification, namely, 1st, an organism named mycoderma vini, which by its functions assists to produce this decomposition, and after assimilating some of the matter excretes acid; and 2nd, also by the oxidation of the alcohol by the oxygen of the air. There is no doubt that in very sour bread both of these forces have been at work, and although there is no doubt that the various acetous, lactic, vinous, butyric, and mucic fermentations are largely due to the work of organisms, there is also no doubt that acetic acid can be produced solely by the oxidation of alcohol.

On the one hand, it has been demonstrated that upon adding small quantities of ammonium phosphate to furnish N and

alkaline and earthy phosphates, the atmospheric germs became fertile, and an alcoholic was converted into an acetic fermentation, this showing it was the work of organisms; and on the other hand, Buchen, Davy and Döbercines demonstrated that the bringing of oxygen into intimate contact with alcohol, by passing (among other experiments) whisky and water through ozonized air. In a few minutes it was converted into vinegar, and factories were opened for the purpose of making vinegar by this means.

THE CARBONATES AND BICARBS USED BY CONFECTIONERS.

Bicarb Soda ($2NaHCO_3$) is produced by a mixture of common salt (sodium chloride, NaCl), and sulphuric acid (H_2SO_4); being heated together, the heat causes a decomposition represented by this equation

$$2HaCl + H_2SO_4 = Na_2SO_4 + 2HCl.$$

That is, you see, a mixture of salt, sulphuric, and hydrochloric, and is the caustic soda of commerce. To make this into wholesome bicarb for food use, the solid salt cake (sodium sulphate) is again treated. The HCl is driven off, and the cake is mixed with coal slack and chalk or limestone (to form the carbon), and again heated; the product again is then a carbonate, and after treatment with air then becomes wholesome bicarb soda. There is another process (but not so much in common use), by which carbonate of ammonia, common salt and carbonic acid are mixed and heated, these are decomposed and form the new product.

Ammonia carbonate $2(NH_4)2CO_3CO_2$. It is a volatile irrespirable gas. It possesses strong alkaline properties. It turns red litmus blue and turmeric paper brown. It is slightly inflammable, and stops the combustion of other bodies. It is composed of 2 volumes of N (nitrogen) and 6 of H (hydrogen); air being taken as unity, its specific gravity is 0·5893. Ammonia is to be met with in many organic compounds, both vegetable and animal. There are two modes of making it, one during the preparation of animal charcoal (in the destructive distillation of bones for the char for sugar refiners), and another during the manufacture of coal gas. The gas liquor is run into a retort, some slaked lime is added, heat is applied, and ammonia distills over; this is again redistilled, in nearly the same way as alcohol, until it is pure enough for food. In use by confectioners, there is a great difference in the mode of its decomposition—other carbs require moisture, heat, and an acid to help to evolve gas. Ammonia is decomposed by heat, which disunites its

chemical composition—the ammonia flies off, carbon dioxide gas is generated, and raises the goods. Carbonate of ammonia varies very much in its composition; like many other preparations it suffers from indifferent makers, varying in quality from 30 to 50 per cent. You will, perhaps, have noticed that biscuits or small goods, in which it has been used, sometimes smell strongly of it when coming from the oven. This may happen from an overdose that has not been neutralized by the heat of the oven, but in some cases it occurs from the ammonia being inferior, and you should mention it to your wholesale druggist. Buy it powdered, it is much easier to use.

Glycerin is of great value in cake making, because it does not dry. It will not evaporate until decomposed by calcination. It is one of the fatty acids, with an alcohol base. It is a product separated during soap making. The soda ash or other alkali is mixed with fat and water and boiled, and the fat alkali becomes mixed into an emulsion, called saponification, and the glycerin is separated from the fat in the water, and is recovered by treating the waste or spent lye-water and alkali that does not enter into the soap, but settles at the bottom when cooling. Beneficent science has found and preserved this wholesome foodstuff glycerin for man's use.

Hydrochloric (*see* bicarb soda) is separated in the manufacture of soda, ammonia in the manufacture of coal gas, and glycerin from soap. Wonderful is nature, and wonderful are the uses and power of science.

THE ESSENTIAL OILS, LEMON, ETC.

These are sometimes mixed with alcohol to keep them bright and clear. Sometimes with fatty oils, resins, and fish oils, to cheapen them.

Tests. First feel, pure oils are rough and dry between the fingers; impure oils are greasy; pure essences, when a spot is dropped upon paper and put into oven, evaporate, scarcely leaving a stain upon the paper; fatty oils will not evaporate, they leave an oily deposit. This is also the case when distilled. Put a little in a small glass retort over a bunsen, the essential oil distills over, impurities remain. Put 5.cc of the essence into a test tube, add 1.cc of pure sulphuric acid, the higher the temperature in samples tested, the more impure the essence. Rape oil rises to a 100 F., olive oil, 68°. Try the essence and fix a standard for heat; put 10.cc of the essence into a test tube, and drop a piece of Sodium (*be careful with this, it explodes when in contact with water or air*) the size of a

small pill into it; if it is impure, the Sodium will dissolve with effervescence; if pure, it will not. If alcohol is in the essence, it is detected by putting into it a small piece of Calcium Chloride ($NaCl_2$), alcohol dissolves this, and it remains as a precipitate: to get percentage this test should be performed in a small graduated test tube, and the amount of precipitate read off.

If fish oils are present, they can be detected by the development of a red colour when boiled in a caustic soda solution.

Ginger is the root stock of a small plant. Its odour is due to an essential oil, its hot taste to a peculiar resin contained in it. It is frequently tampered with; its essential ethereal oils, being abstracted by immersing in Alcohol, which absorbs; this is taken away and the ginger redried and sent to market, the essence so obtained being the best for mineral waters; it is clear, not cloudy.

Analysts have a difficulty in proving that ginger has been half spent that way. Dr. Barker Smith's method in this book is a good Test for Strength, and also for the other essences. There are three sorts usually on the market, Cochin, African, and Jamaica; Jamaica is strongest, but darkest.

GAS ENGINES IN THE BAKERY.

THE use and management of a gas engine is a necessary part of the knowledge of a progressive baker or confectioner; a few words anent thereto will therefore be required in the Bakers' Guide. We will begin with the belting. The manager of an engine should understand the management of belts. What are belts? Belts are means whereby power is transmitted from one point to another. There are several kinds of belting. First, leather; and some think there is nothing like leather. The sizes and thickness will depend upon the amount of power to be transmitted. Although power is carried by belting for considerable distances, it is thought by those who know that it is not profitable to carry it by belting for more than twenty-five feet. This fact should be in mind when erecting bread-making machinery. Sometimes ropes running in grooves are used instead of leather; sometimes, when very heavy work is required, chain belting is used, running upon metal teeth—cogs.

Mending or Joining Belts is usually by butting or lapping. To mend by butting, bring the two ends level together and lace with stout strips of leather. To lap is stronger than to butt, but there must be several inches more belting. The mode of lacing in either case is to punch a corresponding set of holes in

each end. Three sets of two holes. Lace transversely, and securely fasten the ends upon the *outside* of belt. There is a simple and very convenient metal fastener now used in the place of lacing, resembling a large size boot protector. The ends of belt are brought together, and the fastener overlaps both ends, and is driven into the leather; but the tendency is to break away the ends of belt, and then it will require lacing, These metal fasteners are suitable for light work—cake machines, &c.; but two or three sack dough mixers should have laced belts.

The Gas Engine is a machine worked by the energy derived from an explosion of a mixture of air and gas, taken in as follows: There is a cylinder in which are four holes; one for letting the gas in, one for letting the air in, one for letting the results of the combustion out, and one to let a flame of light into a small chamber so as to touch the mixture of air and gas, and explode them by lighting the gas that has come in. These holes are covered or uncovered by a slide which moves backwards and forwards, worked by an eccentric, as in the case of a steam engine, with this difference: the slide moves to and fro once while the crank shaft makes two revolutions. In other words, the slide makes two strokes while the piston makes four. When you turn the wheel the piston moves forward, and a charge of air and gas is drawn in; the piston moves back, compressing the mixture of air and gas, and then the charge is fired by the light at port hole, and the piston is driven forward; by the revolution of the crank the piston returns and expels the waste products of combustion into the exhaust box. The energy derived is at the third or working stroke. During the other three strokes means are found to carry on the work of the engine by stored up energy not used in the first and second strokes. The fly-wheel is a conservator of energy, has usually a very heavy rim, and is large and heavy in comparison to the other parts. Most know that it is easier to catch and stop a light indiarubber air ball than a solid leather cricket ball, for the reason that *the energy in a moving body is proportional to its weight.* During the third stroke a large amount of energy is given to this fly-wheel, and the rapidly revolving fly-wheel gives this energy out again during the next three strokes, and so on.

The use of the governors is to regulate the amount of gas going in, upon the principle that a heavy ball swinging in a circle round your head by means of a string, the faster you swing the ball round the surer will the ball rise to the horizontal plane of your hand. If the engine is going very fast the two balls of the governor fly farther apart from each other, and in doing so work

a lever which shuts off some of the supply of gas; and then, when they drop down by the speed being reduced, the lever opens again and the gas supply is increased.

H. P. plan :—P. equals pressure per square inch of cylinder, L., the length of stroke. A., the area of cylinder, N., the number of working strokes per minute.

Friction.—No matter how tight your belt is, there will be slipping. The belt and the pulleys will not run at the same speed, and there will be friction; but, unless quite compelled, do not put rosin on the belts, it will wear them out faster. Nor should water be used, it has a corroding action upon metals, and also impoverishes the leather of the belting. The best way to reduce the friction caused by slipping of the belt, is to reduce the strain of work, and when they stretch too much to take them up an inch or so tighter. Very tight belts in dough-making are dangerous, the resistance of the dough being unequal as it gets firmer, and, perchance, too much flour is put in, and it makes it very hard, or some solid substance falls in between the blades, then something would give way, and it is better that the belt should slip than break, or the shaft twist or engine pull up from its bed. There is a prepared and special lubricating jelly or paste, filled into caps, the caps being screwed down over a pinhole: the revolution and warmth draw the lubricator down on to the shafts and pulleys, and parts where friction occur. The best oil only should be used; inferior oil will clog, and at too low a flash point, it is useless for quick running machinery. Boiled linseed oil is not the best to use, you seldom get it pure. Very good lubrication is made by mixing linseed oil and hogs' lard together. Beware of friction, give immediate attention to any noise, or any bearings that get hot. Friction is very destructive, therefore keep engine and machinery well oiled, and always clean. A little grit or dust getting into the more delicate bearings of the gas engine will create mischief, and will soon destroy its efficiency. For this reason the engine should always be enclosed in a separate room, or partitioned off. The slide valve, or the ignition tube, whichever is the type, should be taken out, carefully cleaned every week, or the explosion will be spoiled; but great care is necessary, the parts must be accurately adjusted again, or friction and bad work will result. The spindle of the tube must be worked into the proper place. If you have not been taught how to do this, send for a proper workman, and don't interfere with it yourself.

The Exhaust. The exhaust pipe should be kept clear of wood or other inflammable matter, as it gets very hot when in continuous use. The pipe should not have many, or too acute,

angles; angles interfere with its good work. The circulating pipe should slope up the whole way. The water tank should have a ball tap, and at a proper level a waste-pipe should be fitted to tank, so that, when in continuous use, and the water gets foul and hot, the water can dribble out of waste, and dribble in from ball tap. A gas engine gets very hot during continuous use, and a constant circulation of cold water round the cylinder is absolutely necessary, to prevent destruction or damage by the heat.

To Slacken Speed. When only a little power is required, take off cap from governors, and turn off gas slightly. Don't waste gas, either by running and doing no work, or by leaving port hole alight when engine is stopped. When you buy a gas engine, buy one larger than you want. It is an unpleasant experience to have an engine slowing up and stopping when it receives too much work for its size. An increase of trade will mean, otherwise, the buying of a larger engine.

BAKER'S BOOK KEEPING.

FORMS from which to ascertain Averages, Percentages, Gross and Nett Profits, Amount earned by Labour, Waste, Misappropriation, &c.—In a bakery the first of these forms in the order of importance will be that dealing with flour; and as weekly is convenient, that period is taken and averaged at cost per sack, exclusive of labour.

FLOUR IN STOCK AND CONSUMED DURING THE WEEK.

DATE WEEK ENDING	NAME OR MARK OF FLOUR.	STOCK LAST SATURDAY		ADDED DURING THE WEEK		NOW IN STOCK, SATURDAY		QUANTITY CONSUMED DURING WEEK.		AT WHOLESALE PRICE PER 280 lbs.	TOTALS.		
		Sks.	Bshs.	Sks.	Bshs.	Sks.	Bshs.	Sks.	Bshs.		£	s.	d.
	Whites ...	20	0	0	0	9	2½	10	2½	32/-	16	16	0
	Supers ...	15	2½	0	0	7	0	8	2½	34/-	14	9	0
	Households	25	2½	0	0	19	2	6	0½	31/3	9	10	7½
	Hungarian	5	0	0	0	4	2½	0	2½	40/-	1	0	0
Saturday 1st	Patents ...	10	0	0	0	7	0	3	0	36/-	5	8	0
	Seconds ...	5	0	0	0	3	0	2	0	29/-	2	18	0
	First Grade Bakers ...	10	0	0	0	6	0	4	0	30/-	6	0	0
	Odd Marks	7	0	0	0	4	0	3	0	32/6	4	17	6
	Meal	3	0	0	0	2	0	1	0	29/-	1	9	0
	ConesorRice Flour ...	3	0	0	0	2	2½	0	2½	25/-	0	12	6
TOTAL FOR THE WEEK—Flour								39	0½	COST	63	0	7½
" " " Yeast								...	...	"	1	3	7½
" " " Yeast Food								...	...	"	0	9	9
" " " Salt								...	...	"	0	3	3
" " " Fuel								...	...	"	0	13	0
											£65	10	3
THE COST PER SACK—Flour								...	...	...	1	4	0
" " " Yeast								...	...	...	0	0	7
" " " Yeast Food								...	...	...	0	0	3
" " " Salt								...	...	...	0	0	1
" " " Fuel								...	...	...	0	0	4
											£1	5	3

FLOUR IN STOCK AND CONSUMED DURING THE WEEK.—*Continued.*

DATE WEEK ENDING	NAME OR MARK OF FLOUR.	STOCK LAST SATURDAY		ADDED DURING THE WEEK		NOW IN STOCK, SATURDAY		QUANTITY CONSUMED DURING WEEK.	
		Sks.	Bshs.	Sks.	Bshs.	Sks.	Bshs.	Sks.	Bshs.
	Whites ...	9	2½	5	0	6	2½	8	0
	Supers ...	7	0	10	0	11	0	6	0
	Households	19	2	10	0	7	2	22	0
	Hungarian ...	4	2½	0	0	3	0	1	2½
8th	Patents ...	7	0	0	0	4	0	3	0
	Seconds ...	3	0	0	0	1	0	2	0
	First Grade Bakers ...	6	0	0	0	3	0	3	0
	Odd Marks	4	0	0	0	1	0	3	0
	Meal	2	0	0	0	0	0	0	0
	Cones	2	2½	0	0	0	0	0	0
						TOTAL		48	2½

NOTE.—Cones or rice flour used in dusting must be taken in and charged against the cost—as shown above—having been used in the production of the loaf. This method of taking flour stock will show the quantity and the kind, and by carrying out the price of each sort, adding up the whole and dividing by the number of sacks will give the cost per sack. In the second example is shown the method to be employed for carrying forward from week to week; the quantity in stock is entered in the column under the heading of *Now in stock*; and if any flour has been added to stock since the previous Saturday put it in the column under the heading *Added during the week*. Each sort must be entered in the line with the name of that flour; you then strike the balance between what was and what is in stock, and in the quantity missing you have quantity consumed. Carry the totals now in the stock column down under the head of *Stock last Saturday*, and that will form the base to work from next Saturday. Having previously ascertained the profit per sack at the price you are getting, and the weekly expenditure for salaries, fuel, light, rent, rates, and taxes, you will see how much profit you have made during the week.

To ensure accuracy in these weekly flour returns and averages, it is necessary that the flour stock taken on Saturday be absolute and not approximate; to this end the baker must arrange that small odd parcels of flour in troughs or sacks be used up as far as convenient for Saturday's bread. All flour used by pastry-men, scaled and sent out, or otherwise, must be deducted from week's totals before averaging for cost per sack for bread; and further, especially note a week's averages may be entirely upset by the non-delivery of a couple of bags of flour. In many places no person has charge of the flour room; the door is opened and the flour-carrier is left to put the flour in how the thinks best; and if the place is fairly full, or he has brought a lot, unless some person takes account at and during the time of the delivery it is difficult to attempt it afterwards. Another particular note: the buyer of flour, for a large modern business, will usually know the quality of flour independent of the mark on the sack; and frequently flour will be so bought and sent in that those who use it do not know its quality; therefore a weekly form must be issued bearing instructions as to quantity and qualities to be blended for the different uses—rolls, Vienna large-bread, scaling up, etc. The storekeeper should also keep an accurate return

of the quantity of flour scaled and sold. Scaled or sold flour must be deducted from the flour used before an average of the quantity of bread per sack is struck.

NAME OF DEPARTMENT, OFFICE, OR FACTORY. DATE.

BREAD ORDER FORM.

Please make and deliver to Bread-room or Shop, or No. 1 Round, &c.

No. Required.	Description.	No. Made.	No. Received.
	Plain Crummy ... 4 lb.		
	„ „ ... 2 lb.		
	Cottages ... ... „		
	Bricks—Notched „		
	Brunswicks ... „		
	Whitepans or Tins „		
	Wholemeal ... „		
	Milk ... ... „		
	French ... ... „		
	Belgian ... ... „		
	Sandwich ... ... „		
	Collaw ... ... „		
	Twist ... ...at 2d.		
	Cobs ... ... „ 2d.		
	Cakes ... ... „ 1d.		
	French Rolls ... „ 1d.		
	Dinner „ ... „ ½d.		
	Vienna ... ... „ 3d.		
	Vienna ... ... „ 2d.		
	Vienna ... ... „ 1d.		
	Rosettes ... ... „ 1d.		
	Crescents ... ... „ 1d.		
	Queen's Bread ... „ 1d.		
	&c., &c.		
			Total....................
Total Number... ...			
2-lb. White Loaves...			
Wholemeal			
Pence inclusive ...		Signed for Bakery.	For Storekeeper
		....	....

Note.—It is urgent that this form be accurately filled in, signed and taken into the office as soon after the day's bread is made as possible. The above form can be altered or amplified to suit the trade; plenty of room between lines should be allowed to fill in the figures in the bakehouse; every pennyworth of bread made should be put down, and at the end of the day, week, or month, taken with the flour stock for that time, should give the exact average per sack turned out.

To facilitate the making up of this nightly bread order form for the bakehouse, each porter or carman taking out bread should fill in the number of each kind he requires opposite the name printed upon a slip corresponding with the articles printed upon the bread order form. The clerk, whose duty it is to make up the bread order, will copy these totals with the total ordered by

shop, and add them together, which will be the quantity required.

Bread Order for Bakery.—This form is drawn to connect the shop with the bakery, and also the bakery with the flour-room. The total number of each kind of bread required should be filled in opposite the name, and handed to the foreman at the beginning of each day's work, and having entered the exact number made at the finish of the day's baking, sign for the number made, and return the order to the office. He should endeavour to make the number ordered within a few loaves, which he will be able to do if he has given the necessary attention to the instructions given at the technical class, and measures his water by the quart or gallon exactly, and not by guessing so much in a pail or tub. Have an exact measure of water, and ordinary care in dough-making will keep the quantity near enough. It is important that the number ordered and made should be closely watched, and serious differences more or less should be marked against the maker. Random making will not be allowable in a modern bakery. The bread order form when taken into the office should be used to check, first, the sales—if 1,000 are made, 1,000 loaves should be accounted for at the end of the day; second, the totals be totalled once a week, and all the small bread reduced to loaves and added to large bread totals, and that will give the total bread made during the week.

To find Average per Sack.—In the bread order form already given, an exact return of all bread made has been recorded. To obtain the average number of 4-lb. loaves per sack of 280 lbs., reduce the number of 4 lb. loaves to the same number of parts, as the number of sacks emptied. If there have been 10 sacks emptied, and there are 1,000 4-lb. loaves, that will be 100 per sack.

If any article, whether cakestuffs or breadstuffs, sold is strictly for cash, a simple form will be sufficient to book in from, but care must be taken that every customer's name and address is entered in a book, kept at the bakery, so that in the event of a carter meeting with an accident, it will be possible to send another on the round. A roundsman is also a very useful addition to the staff. He should be acquainted with all rounds. A daily register of every added name, and of every name taken off, should be an imperative rule, so that in case of the loss of a customer the why and wherefore may be ascertained, and the possibility of recovery be considered.

To prevent—or hinder—the present wholesale filching of customers by roundsmen and canvassers, bind each by an agreement not to *solicit* the customers served by them for you, after leav-

ing your employ; such customers having been obtained by the use of your name and money, and for which they have been paid.

Check Form for Raw Materials.—The manufacture and sale of cakestuffs is receiving at the hands of present day competition the same treatment as that accorded to the making and selling of breadstuffs, and must be carefully conducted through every stage and detail of the process. Less waste of raw material and stale, a more modern adjustment of profits and an actual, not approximate, knowledge of the cost price of every article is urgent. Bakehouse tradition, trade usage, present price, must be very carefully considered before being followed; ordinarily they represent too much of the past, and not enough of the present; at their best they do but resemble an old well-worn vehicle, obsolete and past service. The annexed form, if firmly adhered to, will show the cost of the raw material, how it has been used, and where it should have gone to.

MATERIALS FORM.

To be filled in, and when checked and initialed by the receiver to be returned to the office.

	FLOUR.	BUTTER.	MARGARINE.	CASTOR.	RAW.	CURRANTS.	SODA.	CREAM TARTAR.	MILK.	EGGS.	SULTANAS.	JAM.	PEEL.	AMOUNT PRODUCED IN SHILLINGS AT SALE PRICE.
Scones.	lbs. 21	lbs.	lbs. 3	lbs. 2¼	lbs.	lbs.	ozs. 5	ozs. 10	pts. 11	No.	lbs. 2	lbs.	lbs.	15/-
Lunch Cakes	9		3	3¾			¾	1½	4½	30	3		½	18/-
Pastry.	3½		3					¼		2		1		9/-
6d Wines	9		3	4			½	1	2	9				9/-
TOTAL *Used and Earned.*	42½		12	10			6¼	12¾	17½	41	5	1	⅛	51/-

This outline will explain itself; names of goods can be increased or altered to suit the work in hand. The totals at bottom of columns of material used will give the amount to be credited to the workmen. Paper, colouring, flavouring, etc., too small to be estimated on the article, must be added to the gross cost of the day or week's produce, before striking a balance for profit.

The storekeeper, or other qualified person, will credit pastry-cook with these totals in the stock book, and the office will enter the total of work done, for the purpose of ascertaining how much the workman has earned during the day or week. The cost of labour will be conveniently ascertained at the end of the day, week or month, by totalling produce column, and making an average. If at the end of day's work £5 worth is the total of goods turned out by man and youth, and their hire has cost 10/-, then ten per cent., or whatever is the actual percentage, must be added to the cost of the raw material, and will then give gross cost of production.

The store will open a debit and credit account of quantities with the head baker, pastrycook, confectioner, or *chef*, entering to him butter, sugar, eggs, etc., as required, and at the end of day, week, or month, the total of goods used—taken from materials form—with any balance of material he may have in hand, should make up the amount given out from store; comparing these totals with invoices will also control the storekeeper.

Every item must be put down to the debit of the user—wafer paper, paper used in bands, bottoms, or wrappers, essences, colouring, chemicals, and also small tools, cutlery, knives, spoons, moulds, etc., etc. The most stringent rules should be enforced in regard to this matter. The workman will not—has no right to—object; if he is to receive liberal payment, he must take a more intelligent interest in the economy of his tools and materials. "I don't care" will have no place in modern arrangements either side. Some workman may object to give his recipes by putting down all the items used, and properly so, if it is this knowledge which gives him his special value and is a revelation of what he regards as his private property; though to withhold this information may be legitimate, it is not convenient, and must not be permitted; this private property in recipes must either be bought by the firm and added to their stock of standard formulas, or the goods must not be made. It is not expedient to push goods that depend upon a perpetual continuance of employ for their out-turn, or that will nullify the rules of the firm. There should be given printed sets of standard formulas for all work under the control of the confidential clerk. It must not be expected that the workman will make up these forms, his

time is worth more to the firm. A sharp lad, possibly one of those helping (the apprentice or improver) will, during the work, and under the supervision of his chief, count or weigh up the goods, as they are made, and with pencil write down by dictation the quantities of material in them. The amount of goods sent to packing room or shop must be checked by the receiver, who then becomes answerable for them (see form for salesman). These materials forms should be sent into the office and occasionally checked as to percentage, and any departure from standard, either in ingredient or yield, should be reported to the principal manager. If the sellers of small goods under the old *régime* had watched their stock of raw material, the yield of mixture and the time taken to make them, their idea of the great profit on smalls would have been different; upon some of the goods the profits are much too small, and upon others as much too large. With some *petits fours* and *gateaux*, though representing 100 per cent. profit on the materials, the time occupied in finishing and decorating is so much longer in proportion to other goods, that when added to the cost of the material, the percentage of profit comes out even less than that on commoner cheaper articles.

It will not be convenient to check the manufactured article from the chef or restaurant in a lump, because goods from these departments are sent up as required—a cup of chocolate, cutlet, soup, etc. Therefore all goods required from them should be ordered by printed slip, bone, tin, or other ticket, bearing the cash value of the goods wanted in sale shop, or sent out. The chef should not send out any goods without these vouchers, as they represent the amount or value of the work turned out, and they should be kept carefully by him, to compare with the totals of raw materials sent him, and will show the total work turned out also, say weekly.

Sales.—Having made arrangements to provide for proper receiving and checking of stock, the class of goods to be made and their standard formulas, gross and nett profits, the debiting of the workmen with the materials, and crediting of same with the sale value of articles made, the estimates of the value of labour by the amount of work turned out, the mode and price of sale, etc., it is now necessary to trace the produce until it is sold, either by being entered in the ledger to the debit of a customer's account, or (and much better) the cash for it is through the medium of the paying in book safely entered to the credit of the firm's account in the banker's books. This tracing will be done by having a form to regulate shop and other sales, as per the following example, modifications of which to suit the different

Date THE SHOP SALES RETURN FORM.

GOODS RECEIVED IN SHOP OR SALESROOM TO-DAY.	DEBIT.	SALES ACCOUNT.	CREDIT.		DEBIT.	STOCK SUSPENSE ACCOUNT.	CREDIT.
	£ s. d.	By—	£ s. d.		£ s. d.		£ s. d.
506 Loaves at 3d.	6 5 0			Forward ...	15 14 5	By Stock...	14 10 0
300 Pence Fancy Bread ...	1 5 0					Allowance on Stale and Depreciated Stock ...	1 4 5
Flour Confectionery	5 10 0	Shop Cash Sales	6 10 0				
Sugar Confectionery	3 10 0	Accounts paid in as per Cash Books	7 10 0				
Goods from Chef's Departmt.	4 10 0	Paid in by Porters	3 10 0				
Mineral Waters	0 16 0	Credit Sales as per Day Book and Ledger	6 10 0				
Tea 2/4, Coffee 2/4, Milk 2/6	0 7 2						
Chocolate 3/4, Sugar 2/11 ...	0 6 3						
Mustard 1/-, Pep. 1/-, Salt 6d.	0 2 6						
Brought over Stock Suspense Account	17 10 0						
	40 1 11		24 7 6		15 1 5		15 14 5
		Balance forward to Suspense Account	15 14 5				
NOTE.—Include here all goods received, whether own or other Manufacture, taking care there are no omissions.		Include here totals of all Cash received and Credit Sales.					

styles of business will adjust the details during the working :—*A thing that it is necessary to do will itself suggest a way; not the only, or the best way—but a way according to the foreknowledge or instinct of the person devising it—and sufficient for the purpose.*

In a mixed trade there is a twofold hindrance to a daily checking of accounts, namely, stock-taking and "stale" and waste. The cost of labour involved in too frequent stock-taking of candies, biscuits, and confectionery, is considerable. The stale goods, though depreciated, will realize a part of their value a day or two hence, and this part must be accounted for at some time. Believing that a monthly stock-taking and settlement between departments will be more desirable in view of these difficulties, and that in most cases it will be quite as safe and undoubtedly cheaper, I have drawn this form, based upon a period of time, whether of one, two, three, or four weeks, to suit the style and extent of trade, or preference of managers, and which will fit in with the arranged time of balancing the workmen's output values.

The working principle of this form consists in the consignment of all goods to be sold direct to the seller or sale department at the usual sale price, keeping a debit and credit account, with a periodic stock-taking and balancing up. The stock suspense account is opened for the purpose of carrying forward the amount due on unsold and accumulating stock, which amount should be balanced by the stock in hand at the time of stock-taking, except say a two-and-a-half per cent. allowance for deficit lost upon the sale of stale or depreciated goods. With this waste allowance must be taken the reductions granted to purchasers taking quantities; but such reductions, when possible, should be taken off the sale price or workman's totals form, and not charged to sale shop, and, therefore, would not require to be taken off; also when goods are damaged in making, *the price they are expected to realize*, not the usual sale price, should be entered in the workmen's totals as the price to be obtained for them. This will put the loss where it ought to be—upon the maker of it, the workman, whose totals of work done will be that much lower. The manager or principal will not always see the goods made, and these totals will be most valuable to him at his daily, weekly, or monthly inspection of them in pointing out the useful from careless men, and will also be an incentive to the workman who knows he is to be judged by results.

When the sale shop is divided in departments for the sale of the different goods, it will be quite convenient to have separate tills and separate accounts for cash, and obtain an accurate return of the profits on them; but when the sale shop is not so divided, it will not be so convenient, and the keeping of separate tills need only be resorted to when it is necessary to

trace the source of a suspected leakage; when it is desirable to do so, book to each its own peculiar goods, keep a separate till and open a debit to credit and suspense account for each as per form. This dividing into the different tills will be strange at first starting, but will become quite natural from use; as I have said, a thing necessary to be done should be done and usually *can* be done.

THE LENGTH OF TIME, AND OF THE DEGREE OF TEMPERATURE OF WORKING THE PROCESSES, AND OF THE OVEN.

IT will be noticed in some places, I have put a very wide margin between the extremes of heat, 70 degs. to 90 degs. (Fahr.). The reason for this is in the great difficulty there is in ascertaining the heat of the bakehouse and flour where the heats have to be applied. Climatic changes have to be accounted for, and also the length of time before being put into oven.

Further questions to be asked and answered would be: Where is the flour stored—in a loft over the bakehouse or in an outhouse? How many degrees of heat will the flour take from the warm water when it is mixed with it? Is the bakehouse cold and airy, or close and warm? Does the biscuit-baker follow the bread-baker and leave, as the natural result of his day's work, everything quite hot? By this it will be seen that the worker to be safe, must learn to depend upon the experience gained in actual work. He should also have a thermometer to test his liquor, likewise a thermometer in the form of a round glass tube, or a metal cased one to put into the floor, sponge and dough. The actual state of the weather outside has only a partial effect when the baking operation of any sort goes on nearly the whole round of the clock. Sometimes the flour is stored in the bakehouse or over the oven, and is always warm and dry; or, *vice versa*, it may be stored in an outhouse and be nearly frozen —in this case what an influence it will exert in determining temperature! Many other things will come to your remembrance if you think; I merely mention these to show how unwise it would be to trust too much to figures in a book, if it attempts to establish hard and fast rules. The heat to be obtained and maintained after the flour is in should be governed by the length of time it has to stand.

The time required for a ferment or sponge will be in proportion to the heat employed and quantity of yeast and yeast food

used; for every increase in heat, or the quantity of yeast, will give a corresponding increase to the speed at which the sponge and ferment will work; the quality of the flour also will make a difference—a poor flour that is deficient in gluten will work quickly, the yeast will soon exhaust it and stop working; and *vice versa*, a strong, good flour will offer great resistance before degradation sufficient to make moist bread sets in; and, of course, the strength and freshness of the yeast will materially alter the length of time required. A half-dead or faint yeast will drag on very slowly indeed.

The time required for the dough to be ready will depend upon the amount of change of gas that has been developed in the earlier stages of ferment and sponge, and the quantity of salt used. If the sponge has been "worked" warm, and allowed to stand many hours, and a very strong gas thus generated, only sufficient time will be required to allow this gas to permeate the dough—say about half-an-hour; but if made from thick or patent yeast, and seasoned with a full quantity of salt, then one or two hours will not be too much. The time allowed for the dough must also be governed by the sort of bread that is required, as we have shown elsewhere in the various recipes for bread-making.

The time required for moulded rolls or loaves to rise will be governed by the firmness and life of the dough and loaves when moulded. If the dough is warm and full of life, 2-lb. and 4-lb. loaves will be ready in a few minutes, and small bread in about half-an-hour. A warm, moist atmosphere will cause dough to "prove" very quickly; a dry, cold air has an opposite effect, and retards the rising.

The time required for baking bread depends upon the size of the loaf, the heat of the oven, upon the lightness and ripeness of the dough; and if only a small quantity of salt has been used, then the dough will be light and dry, and will bake very quickly, but if the gas has been developed slowly by a long process of fermentation, with only a small quantity of yeast to start it, and plenty of salt to "steady" it, then the flour, etc., being in an advanced stage of chemical transition or decomposition, will render the dough moist and bulky, and it will, as a consequence, require considerable baking.

The preceding remarks may be summed up as follows: A brewer's yeast ferment should be worked at 80 degs., and, when *healthy*, will take from four to six hours. The sponge worked at 80 degs. (in temperate weather) will "drop" first time in about four hours, the second "fall" will take from one to two hours, and the dough, if made up at 80 degs., will take from one and a half to two hours.

A patent (compo or store) yeast ferment should be worked at 85 degs., and will take from six to nine hours; the sponge at 85 degs., from four to five hours; the dough at 80 degs., from two to three hours.

A French or German yeast ferment worked at 90 degs. will take two to three hours; a sponge at 90 degs. (following after the ferment), two hours; if the sponge is worked without a ferment it will take four to sixteen hours, dependent upon quantity of yeast and heat. The dough made from a sponge that has succeeded a ferment, will require only a few minutes before being "scaled off"; but if the dough is made from a sponge without a ferment, then it will require two hours, the moulded loaves ten minutes, and the rolls half an hour. If made from a ferment without a sponge it will require four to six hours, and and depend upon the quantity of yeast used.

The time required for baking bread will vary, as we have said, according to the size of the loaf, the condition of fermentation when it was moulded, and the heat of the oven. Mr. Jago, in one of his lectures, said that 2-lb. loaves will bake in about forty-five minutes. This was taken exception to by some bakers present as not being long enough; one said sixty minutes would be better; and another said he had baked bread for twenty years, and never knew a batch to be thoroughly baked in less than one hour and a half. I have no hesitation, however, in saying that each of these statements was and is correct. The lecturer would probably have before him the result of a practical test, in which he had demonstrated that a certain sort of loaf, put into the oven without touching—"set crusty," as the baker would say—the oven being also rather hot, would be well baked in forty-five minutes.

The second baker, when he said sixty minutes, would probably have in his mind a large oven, well filled with cottage bread, that had been well fermented, and which, if not actually "set crumby," would be close together; and in this case one hour would not be too much. The third disputant would represent one of those bakers whose shops are placed in the midst of a settled, working-class population, and whose customers' requirements are very regular; and therefore, day by day, his oven, that most likely had been allowed to lie down, would be filled with the same quantity of batch bread, "crumby bricks," and cottages; and then it would be perfectly accurate to say one hour and a half would be required to bake it. A little light here will be sufficient to show that the whole matter lies in a very small compass.

The point at which cooking commences is reached as soon as the article is heated to 212 degs., and the speed at which

it will be cooked or baked will depend upon the amount of surface exposed to the heat. A baker's oven is usually heated up to 500 degs. when designed for baking a batch of bread; if the loaves are placed in this oven, say an inch apart, then each loaf will have a certain number of cubic inches of heat all to itself, and will present to that heat a large amount of surface—the heat, in fact, striking it from the bottom, sides, and top at the same time, and consequently passing through it from several points at once; therefore, it will bake very quickly, and the more quickly if light in texture, and the dough be made of weak flour, as the heat will then pass through with greater facility. But if the loaves should be put so as to touch each other, and fifty more of them be put into the oven, then, as a consequence, the heat will have less surface to act upon, and have at the same time more work to do by the addition of the fifty extra loaves, and therefore will take a longer time to do it in. These remarks apply to ordinary crusty bread; but when we come to crumby or batch bread, the difference is still more apparent, the heat of the oven being the same, and every square inch covered with closely-packed, and also more numerous, loaves. Then each loaf will present still less surface—in fact, will only have the top and bottom heat to depend upon, and until the whole batch becomes heated through and gives off a dense body of steam—which is a most important help in baking this kind of bread—the process of cooking will be very slow indeed.

By this explanation it will be seen that there is a considerable danger of misleading the amateur baker, if we direct him to the hands of the clock for a guide as to the time in which a batch of bread will be baked, instead of teaching him to rely upon his own experience and judgment in these matters. The best and safest way to proceed, is to open the oven door a few minutes before the time in which you think the bread will be done; and if it *looks* done, draw a loaf out and try it, by pressing (not too hard) upon the softest looking part; if the pressure results in an indentation, then the bread is still doughy and underdone; but if upon pressure it springs back again into its former position, as a piece of ordinary sponge will do when relieved from pressure, then, if it is an ordinary-sized loaf, it will be done.

In heating the oven to bake bread avoid extremes. A rash and scorching oven will destroy both appearance and material, A cold oven does not bake the bread, but *stews* and dries it, making the loaf unsightly, and unpleasant to the taste. Short of actual burning, a hot oven is always to be preferred to a cold one; the bread will be whiter, and have more moisture in it, but it is not very digestible, if of necessity it has to be taken out of the oven before being thoroughly baked. The

heat that exhibits good workmanship, finish, and perfect baking, is what bakers call "a good sound heat." If there is no pyrometer, or heat-gauge, get one put in; it will save much anxiety and loss. If you have one already, 500 degs. (Fahr.), or if centigrade 250 degs., will be a good heat for a 7, 8, or 9 bushel batch. If a smaller batch, say 4 bushels, then 400 degs. will do; but although these are helpful, they are liable to get out of order; therefore we say again, use your own judgment. *Get to know your oven*; watch it carefully, and you will soon know, by many little signs, the heat of the oven. Sometimes a side-flue oven "clears" (looks white) straight up the middle, or on the opposite wall to the furnace, or the door-handle gets hot at a certain heat, etc. The size of the white patches will generally be a safe guide to the heat, for whiteness is a sign of heat when in connection with fire. A black, smoky-looking oven will mean coldness, unless the coals are very "dead," and smoke very much. If the oven is externally heated, it will be seldom necessary to let it "lay down," because if "continuously" used it will always be "sound," and the firing can be gauged by the pyrometer as the baking proceeds.

STRAIGHT DOUGH BREAD MAKING AND THE SEVEN STAGES IN THE LIFE OF A LOAF OF BREAD.

THE success of our Students in the various public competitions and of private firms who have adopted this process of making bread at one operation without a prior ferment or sponge (called Blandy's modern process), warrant a place for it in this 4th edition of the BAKERS' GUIDE.

Two points at least are gained by the bakers using it: First, that without depreciation of what is termed quality in bread (apart from that of flour), there is greater simplicity in detail and a better, nicer loaf; and second, that its adoption will lessen the worry, save space and plant, and make the working of an eight-hour day of easy accomplishment if it became a legalized fact.

Money is the chief object of a commercial business, it cannot be legitimate otherwise. Few poor men—if sane—will expend money and accept the responsibility of a baking business for the love of it only. Profit must be the idea and rightly so, though if business men ignore opportunities for the display of humanitarianism, and forget that the operative suffers from the usual ills that flesh is heir to, aching muscle and anxious mind, that he also needs money wherewith to purchase bread, bed, boots and

books for himself and family, if he does ignore these facts though he is a wise business man, he is also inhumane, a pro moter of strikes and a begetter of profanity and crime. A display of human kindness acts as an antiseptic to strikes; few operatives can be induced to strike if they have kind employers, and this system affords a cheap means of being kind, for it will relieve the severe strain consequent upon a continuance of those ancient processes, of patent, compound, and Scotch flour barm brewing, and ferments and sponges. It will also save the money outlay upon mashing, fermenting and sponging utensils, and the rooms or space required to use them in. The waiting, waste of time on backward sponges, and the uncertainties attending these old cumbrous methods, will be replaced by the simplicity and exactness of science.

The explanation of the theory of this modern process, follows these examples in practice. The recipes will adapt themselves to either manual or machine work, but the figures are calculated upon the use of machinery and other appliances, of a modern bakery.

The first use of a dough mixer generally results in disappointment, and it is looked upon as a very doubtful gain. In many cases the operative, to whom its advent should be as water in a desert place—refreshing, and as welcome as a two shilling a week rise in salary, is the first to jib, grumble, and wish it away. Why is this? Is it because it cannot do its work properly; because good bread cannot result from its use; because it "kills the dough"? No, certainly not. The reason cannot be found in these complaints, for some of the best bread to be found on this terrestrial globe is daily being made by a machine. Shortly, the reason is to be found in the fact that, in nearly every case, the operative and master want to continue the same process of manufacture which has been the custom of the shop, and it is the effort to do so that produces unsatisfactory results. The first effect of the introduction of machinery is an entire change in procedure of work. It would indeed be a doubtful gain if it did not. It is doubtful economy of labour to stir a sponge in a machine, slop it out into a trough, and, when ready, slop it back again into the machine; and the saving of waste is still more doubtful. A big query can also be put against the saving of time; and if added to these doubtful gains there is holey, harsh, and ugly bread, resulting from heat absorbed in process of making, not compensated for by any increase at the start, it is not to be wondered at that master and man wish the machine safely back again in the engineer's shop, and in many cases discontinue its use.

The installation of bread-making machinery is an unalloyed blessing to all. It is hygienic, it is labour-saving to the man, and it does better work for the master; and where the results do not please, an effort must be made by the worker to alter his mode until successful, being quite sure that if good bread is not turned out, it is the fault of the man, and not of the machine. The operation performed by the mixer is so simple that it cannot be its fault.

A cold, backward dough usually results from the first use of a machine, the worker having omitted to allow for the loss of heat taken up by it into its own body. Its iron arms are not kept hot by circulating blood; fleshly arms are. Men's arms and bodies *give heat to* the dough; the arms and body of the machine *takes heat from* the dough; and, therefore, in every case, machine-made dough should be worked warmer than when made manually, and especially so when doughs are made in it with lapses of time between each mixing; for, in that case, the heat taken from the dough up into the machine is given out again to the surrounding atmosphere before the next dough is made; but if there are several doughs made continuously without any interval, the succeeding doughs should be worked at a lower temperature than the first dough.

Observe, next, that sponges and doughs worked in a machine will take longer to mature by reason of being better made, and not because they are "felled" and "killed." Every atom of flour in a well-stirred sponge or dough is brought into contact with the yeast and moisture, and if not altered will show immaturity. This is so whether the work is done by man or mixer. All practical men know that the more work put into a sponge or dough, the longer it will take to work through. To put a piece of dough upon the brake, and give it a good braking, is to delay its maturity an hour or two; but the result is the difference between silk and sacking. It is much easier to stand and watch a machine make dough than to make it one's self; and, therefore, in the majority of cases, doughs made by a machine receive double the making received by hand-made dough—sometimes more than is necessary to good work. Oh! ye buyers of flour and sellers of bread, trail your memory back over the many years, with their myriad "catshead" scrap and "peas" containing doughs, and contemplate the saving that would have been effected had every atom of that unused flour taken up its share of water. Contemplate also the necessity of each atom of flour taking up its share of water, if a righteous law compels its fulfilment in exacting from you two pounds of bread in each loaf, and competition compels you to sell that two pounds of bread at a close price.

It will probably be pointed out that the quantity of bread to be turned out will not permit the increase of time required by machine-made dough. In that case, it will be necessary to do exactly the same as, under the same circumstances, you would do in the ordinary way, namely, to force maturity by adding sugar, malt extract, super malt, diastase, or other yeast food, as well as an increase of heat and a decrease of salt; in fact, to use the same means as when by hand-making. Time is a potent factor.

Let us come to Examples:—1. For a trade of sixty sacks per week—without odd parcels of special and small breads—with an installation of machinery, comprising two externally heated and preferably drawplate ovens with special steam reserve, two sack dough mixer, five H.P. gas engine, four two-and-half sack size dough trucks, a water tempering tank with hot and cold water, and a delivery adjustment; a flour bin and sifter, and, if possible, weigher; over-mixer, and if the ovens are not close to moulding boards, two nests of trays on trolleys, or two travelling racks; two to three dozen loaf carrying boards; four ten-gallon ferment tubs; and four-and-a-half men at salaries—one at 35/- per week; two 30/- each; one at 25/-, and one at 12/6, being £6/12/6 a week, or 2/2½ per sack. If peel ovens are used, five-and-a-half men will be required, and if there is no tempering tank with hot and cold water, and no sifter, then six men will not be too many.

Mode of Working. The half-man—meaning half time of a man—will be required to be in the bakehouse when the others have gone, and his duty will be—eight hours before the time of the other men commencing work—to put in two ferments with 1½ lbs. pure best yeast, 7 lbs. flour, 2 ozs. sugar, and 7 gallons water at 84 degs.; two hours afterwards he will light the ignition tube, and having previously got flour ready in bin, proceed to make dough with one of the ferments and 21 gallons of water at temperature—*query*—this will fluctuate. With the flour at 65 degs., and bakehouse and mixer at 70 degs., take the 21 gallons up at 100 degs.; 5 lbs. salt, ½ lb. of one of the bread improvers, and four bags of flour less the 7 lbs. in ferment, but the quantity of flour must also fluctuate to suit the sort used and the firmness of the dough required. Set the engine at work—it should be alight ten minutes before required, not more—and make dough two minutes each action, four times reversed, that will be eight minutes total; turn out, and make the other ferment up in the same way, but keeping it 5 degs. colder to allow for the hour longer it has to lay. The first dough should be made so as to be quite four hours in trough before men

come to work. When the two doughs are made, take out the clinkers in furnace, and stoke up with coke. After the previous day's baking is done, the furnaces should be filled up with any rubbish that requires burning, and the dampers half closed. When furnaces are stoked, and the place left clean and tidy, put in two more ferments the same as before. This man can then go home until seven o'clock in the morning, when he will probably be useful in cleaning up until ferment time again. Give the doughs plenty of trough room.

There will be these two doughs quite ready when the four men come in, two of whom will proceed at once to light gas engine, and make up the two ferments into dough, and put in the remaining ferment or ferments as required; the other two men will throw out (table), commence scaling the dough, the others joining them as quickly as possible after dough is made, and getting two ovens full as soon as possible. These two doughs will fill the two ovens twice. Then half-hour for breakfast; and throw out the next dough. The drawplate should not be pulled out until all the bread is moulded, which operation should be quick work. When moulded, have half the moulded loaves each side, pull the plate out, shut down the door, brush dust off plate, and two men each side will fill it in from two to three minutes; while filling let the water dribble into cup for oven; push plate in quickly, and bake for forty-five minutes. The Pyrometer should register 240 to 250°. The filling, baking, and emptying, will take about an hour, and the first four batches should be out in four and a-half hours. When the drawplate and this installation are used, one sack an hour, allowing for two meal times, should be the rule for four men who are quite fresh and have had no heavy work, or two and a-half sacks a day to each man. The heat of doughs following the first can be easily adjusted—slower or faster to suit.

2. If a fuller, freer loaf is desired, add to each ferment 28 lbs. more flour, and 1 lb. instead of 1½ lbs. yeast; 5½ lbs. salt, and 5 degs. colder in dough; adjust the time the doughs lay to meet the requirements of style desired. This will have more life and spring in it, and tops should be put on earlier, both to suit strength of flour and the tightness of dough.

3. Straight doughs, ¾ lb. yeast, 280 lbs. flour, 3½ lbs. salt, 140 lbs. water at 90°F., and 10 lbs. of scalded flour; or better if there are many batches, 14 lbs. dough of the last dough worked up into the next, make dough straight up. Let dough stand 9 hours, mould and bake.

4. 1 lb. yeast, 1 lb. malt extract, 3½ lbs. salt, 280 lbs. flour, 142½ lbs. water at 95°F.; prove dough 6 hours.

5. 2¼ lbs. yeast, 1 lb. malt extract, 2¾ lbs. salt, 145 lbs.

water, 280 lbs. flour; heat of water 100 to 110°F.; dough to prove 3 hours; mould and bake.

The examples as to time are near enough to fit all bakehouses, but the capable workman, in a trial of two, will be able to fit his time to his work to a few minutes.

Sponge stirring is wasteful of material, and uses up time and energy, and therefore should be discarded, it savours too much of those days of yore, when it was the custom to buy cheap flour, and spend unlimited time upon it to make it look good in the loaf; when the shape of the loaf and wash on the outside were considered of more importance than the colour and flavour of the inside. Modern buyers of bread have not been slow to support the more modern and progressive mode of baking bread to eat, and not to look at; and those businesses which have spent an extra shilling in flour, and a few pence in diastase, and cared little for the look of the loaf, have mostly received the lion's share of support.

The shapes of bread which require much more time in moulding and shaping, such as plaits, extra long loaves, etc., should be discouraged. They take twice the time to mould than the plainer sorts—coburg, cottage and square—and require more room in oven and care in baking, and thus cost 100 % extra for labour, or two men instead of one. If you cannot get an extra farthing for them, don't make them, leave them to the baker that likes to serve faddish buyers, and accommodate them with a month's credit as well. It is in some of these seemingly simple points that certain of the old shops are losing ground, and giving place in the trade to new firms, whose system is more simple, and what they save in this way they give to the public in improved flour; and the public are not blind, especially those who are prepared to pay. People know the value of ready money now-a-days. Made by the modern process with machinery this is how the cost works out on the lines stated:—

A patent—worth, say	£1	6	0
And a country	1	2	0

Or, one whites and one household town flour will make fine eating bread in the way described—that is, per 280 lbs. £1 4 0

Labour		2	3
Fuel			4
Salt			1
Yeast and yeast food			10
Total	£1	7	6
Add to this a halfpenny for delivery		3	10
	£1	11	4

92 4-lbs. at 5d. = £1 18s. 4d.; gross profit, 7s. per sack. This is ample. (*See* standard price for bread in this book.)

The theory of quick fermentations and straight doughs. To make this simple and easy to understand, I will explain what are the uses of ferments and sponges. If you are a reader, and I hope you are, for if not I do not think that there is any hope for you. General reading clothes the mind of man, gives to the mental image the shades and colourings of the finished picture, and fills up the interstices of its framework, and warp and woof with the thinkings and knowings which make up its homogenity. If you are such a reader, you will have read some of the many notices which have appeared about the ancient mode of bread-making—the pulverized grain of our remote ancestors, the leavened bread of the Hebrews, the fermented bread of the Greeks and Romans, and it must be plain to you that the ferment and sponge of to-day (or may I say of yesterday, for they are now going to their burial in the same tomb with leaven) is but an evolution in the growth of the knowledge about yeast, how it functions, reproduces, has its being, and dies. The abolition of these ferments and sponges will be but carrying on that evolution of the growth of the biological and botanical knowledge of the subject. For what are the uses of ferments and sponges. *The only use of a ferment is the provision of a soil in which to grow more yeast.* In the early days of the advent of yeast, it was so very much mixed with liquid that experience proved that ordinary quantities of this liquid contained insufficient power to aerate and lift the 280 lbs. of flour, and after many trials, that by mixing a given quantity with some warm water, boiled potatoes and flour, or with scalded flour and a mash of malt, and letting these mixtures stand some hours, more power was obtained; and a stage further to mix some of this previously fermented mixture with more flour, and form it into a sponge gave more power still. This result, which was obtained by constant practice, was not understood in its whys and wherefores, the theory of the practice was unknown, and by some is still unknown, and they must read what is said in the previous pages of this book about yeast. Here is a digest of it. Yeast is a living organism, food suitable to its healthy growth is found in flour or malt mash; when placed in liquid solution of this suitable food at a suitable temperature it breeds very fast, it doubles and doubles and doubles its numbers in rapid progressive fecundity. It contains within itself a digestive principle called Zymase, which acts precisely in the same way as the ptyalin and pepsin of the human mouth and stomach, the diastase of malt and the cerealin in bran. These are digestive principles called enzymes. Yeast,

with the aid of this zymase, digests the food it obtains from the flour, uses some of it (very little) for the purposes of building up its own structure, and some of it for respiratory oxygen; and then having used and changed its food, yeast gives off, respires, excretes, as waste, a gas called carbon dioxide and alcohol. Naturally it follows that one cell, like one man, can only do the work of one cell, and live the life of one cell. And light bread is not the result of a ferment or a sponge, but of a sufficient number of yeast cells to do the work. Nor is the counting of them a difficult matter, it is as easy as to say one horse will draw a ton, and if I have a 10-ton load I shall want 10 horses for it. We require 960 c.c.—by measure—of this gas to aerate every pound of flour in the batch, and if it is a one-sack batch we shall require 300,000 cells of yeast to aerate this batch with gas, and it will take then quite 6 hours' time to do it. In that time the first 300,000 will have quadrupled, and more—that is to say, it will take a million and more cells of yeast to raise one sack of flour in a given time, and, therefore, there is no question of ferment, sponge, or any other process, but simply a question of the quantity of yeast that is used. To go back to that one horse and one ton, suppose you have only one horse and have 10 tons of stuff to move one mile, what do you do? why, move a ton at a time, and of course, occupy the time of 10 journeys instead of one. If you use Scotch flour, Parisian or compound barms, you have got a one-horse show, and you must give this one horse plenty of time in which to do the work, and the few yeast cells in these barms will do it—they will breed enough other cells to do the work if you give them the necessary time in which to do it; you may say if this is so, why bother about it, why not go on as we are? but wait a bit before you say it, for I reply, and without reservation, that *if there were no other* changes going on besides those affected by yeast, then 100 cells, given the time to multiply, will do as good work and as safely as 100,000 put in altogether, but there are conditions of change going on with which the yeast has little or nothing to do.

There are the hydrolysing agents, the enzymes, and diastasis at work. There are the putryfactive and the acid-making agents at work, for most if not all of these are present, especially in the more common sorts of flour. With the aid of the water these enzymes are breaking down and changing the albuminoids, and the acid-making germs are present of a certainty in every dough, and it is only the addition of large doses of salt (read the uses of salt) in long processes which permits bread being even eatable, for all the beautiful aromatic and sugary flavour have either been destroyed or evaporated.

Do not say that long processes are necessary for certain yeasts, for that also is a mistake. Yeasts, like men, though of different sizes, strength, and degrees of health, all function alike, that is, they all digest their food alike.

The cell of yeast that is grown in a good wort for comp. and patent, or for a beer or for a spirit, is absolutely alike in its function of living and working, and in either case the size as well as the health and strength will depend upon the skill and care of the grower, farmer, brewer, call him what you like, and if he is a skilful gardener, then he knows the suitable soil for the sort of seed he plants.

There are weak, strong, and large and small cells grown in all the modes of making—yeast is yeast, and will do the work of yeast. And this answers the statement of some that yeast imparts flavour to bread. How can that be said of one yeast more than another, or of any? Yeast gas—CO_2—does not taste, the alcohol in bread does not, cannot taste, because there is not enough of it, and if they did impart taste to bread, to make these is characteristic of all yeasts and the same with the work of its zymase. All yeasts are the same in construction, living, eating and working, and therefore the governing principles of straight off-hand dough bread making are those dictated by facts revealed to us by investigators who have given patient thought to this subject of yeast, and it is pressed upon the trade for trial because it will prevent the bad bread that is a reproach to bakers. It will save time, it will therefore save money.

It was this kind of bread that has won the prizes in three consecutive exhibitions in open competition with the oldest and most experienced bakers.

Yeast is the agent; the more you use of it the more quickly will your bread be ready for the oven, and the longer you let the dough work the finer the texture and volume of the loaf.

THE SEVEN PHASES OF CHANGE IN THE LIFE OF A LOAF OF BREAD.

IF you have read the previous pages about yeast and straight-made doughs, you will have gathered that life is present, and the law of natural growth is at work. The life of a loaf of bread will be seen to be based upon the same principle as the growth, and change in the life of human beings. If you mix 14 lbs. of flour, ¼ lb. yeast, 7 lbs. water, 110 degrs. (Fahr.), and 2 ozs. salt together into a dough, and watch its passing phases in the evolution of its life, you will see first, say

in five minutes, that there are signs of life—it is moving, take a piece and bake it, the bread will be close. It will have only a few vesicles in it, which shows that the yeast has only begun to work (assimilate its food), the vesicles or holes will be small bladders filled with gas and gluten expansion. That is the infancy. Let this dough stand another half hour, still watching it, and this infant life develops into the second stage—childhood. There is more life and movement, more vesicles; another half hour and its youth is reached; put a piece into the oven and it bursts and breaks, and when baked it will be found full of gaps and holes, and much lighter. Up to this stage the dough has felt tough and leathery, but it now begins to get spongy and soft to the touch. Let it lay another hour and bake a piece, and if you have been careful to allow of free expansion after handling, it will burst and break still more than the last piece; but however you use the dough, the baked bread will be more full of vesicles, and much lighter. The dough will be more elastic and more resisting. This is the manhood stage of the dough. In another hour examine the dough, its touch is soft and mellow, the resistence of its fibre is less, bake a piece, and as in the manhood stage, give the piece time to expand again after handling, and the baked bread will have a much finer vesicution, the bread will break up easier in the mouth. It has reached the maturity stage. It has passed over the table of the mountain, and is on the descent into the valley on the other side. Examine the remaining dough, it begins to collapse when you grasp it, resistence is vanishing, bake a piece, it does not spring and jump as it did in youth and manhood, it does not move with the steady strength of maturity, its strength is declining. This is the age of decline and old age; in two more hours examine the dough, it is rotten to the touch, bake it, and it is nearly inert in the oven; this is the age of senile decay, corruption is in rapid progress, let the remaining piece be exposed to a moist atmosphere (throw it on to the potato, or any other, patch outside your door), then nature will get back her own, for the molecular constitution will break up, the elements will be set at liberty ready to build up new life again in plant or animal.

It will not matter in the least whether the dough is made high or low in temperature, much or little yeast is used, sponge or no sponge, these changes will occur, the only difference will be in the quickness of arriving at each stage.

This analogy is natural and correct. Examine the development in the life of human beings around, and you find that some at 20 years of age have the development of others at 30, that some at 45 look as old men of 60, while some at 60 look fresh, blithe, vigorous, and in their prime. The difference is

that some have been made on the quick process principle and some on the slow, but both will have to pass or have passed through these adamantine governing principles of growth and development. Some people exert more energy—mental or physical—in one year than others do in three years, and consequently are ahead in development, though only the same age in years.

To particularize with Theoretical Science in detail after this generalizing, and explain stage by stage the changes which take place in bread-making processes. The **Birth** of the loaf is the putting together of the raw materials. The loaf is begotten and begins to live; the yeast, with the help of the water, soluble matter and sugar present, makes its first meal, and begins work in earnest, and the infancy stage is reached, and the age of the birth of glucose (invert sugar $C_6H_{12}O_6$) and carbon dioxide ($C\,O_2$); the dough is alive and growing, but very crude. The yeast continuing its work changes more of the starch into this glucose sugar, and then eats, absorbs it into its own structure, and having digested it, excretes, as the waste from the meal, more CO_2. This is the childhood stage—growing, green, unripe. This is the age of the development of $C_6H_{12}O_6$ and CO_2. The yeast is now breeding and multiplying very fast and is attacking and changing a much larger quantity of the starch, its enzyme, digestive fluid, is also assuming a quantity sufficient to make itself felt upon the glutenous part of the flour, breaking some of it up into less complex compounds. This is the youth of the dough, strong, vigorous, resisting, growing. It is **the age** of the birth of the change of the proteid matter, the wholesale changing of the carbo-hydrates, the production of maltose ($C_{12}H_{22}O_{11}$), and the birth of alcohol (C_2H_5HO). At this stage there is actively at work upon the constituents of the dough, yeast, enzymes (the digesters), disease germs, the solving power of water and the reaction of each upon the other, resulting in the breaking up of one compound and the formation of another. This is the *manhood stage* in the growth of the loaf. It is **the age** of the beginning of the change of proteid into peptone, the rapid formation of alcohol, the fructification of bacterium lactis, and the beginning of the end of sugar.

This stage is ripe stage, the healthy stage, but it is not fully ripe and fully mature, it has reached the top of the hill of growth, and if baked now, will be beautifully nice; but it may have a hole or two, it may spring out of shape, for it is full of life and strength. This is the bread of health. Let it stand and *decay* if you want perfect shape, for *the next stage is maturity*, and is

on the very edge of the brow of the hill on the going down side. It is **the age** of the end of sugar and the beginning of the tasting presence of acid. Another stage down the hill, and *old age* succeeds it. *This is* **the age** of the fructification of mycodermo aceti—the oxidation of the alcohol and the tissue units followed quickly by the *senile decay stage*, **the age** of the fructification of bacillis subtilus, the breaking up and changing of molecular constitution, and the beginning of nature getting back the elements which she had lent to make up the raw materials.

These changes take place in every kind of process-made dough, the one with a cycle which will be complete in 4 hours for manhood, 12 hours for decay, made with 2½ lbs. yeast and heat 110 degs. (Fahr.). A cycle in 6 hours and 18, with 1½ lbs. yeast and 96 degs. (Fahr.); a cycle in 8 hours and 24, with 1 lb. yeast, 86 degs. (Fahr.); a cycle in 12 hours and 36, with 6 ozs. yeast and 70 degs. (Fahr.). The beginning of each cycle is birth, the end death and the age of the reign of heat, water, air, and bacteria. All the cycles pass through the same stages—some faster, some slower, and by the same evolution of the natural law governing all organic life.

The Use of Salt in Bread-Making

is another important lesson for the baker to learn. Salt in bread-making is as useful as a rudder to a vessel. A right knowledge of the use of salt will enable you to guide fermentation, as well as to alter the flavour of bread. Quite 60 per cent. of the bread made has either too little or too much salt in it. Up to 6 ozs. per bushel there will be no flavour of salt, and the sugar, or any other flavour in the bread, will be unconcealed. From 7 ozs. to 8 ozs. there is a neutrality, no flavour of sugar or salt, and the bread is rather insipid. From 10 ozs. to 12 ozs. to the bushel gives the flavour of the salt. The hardness or softness of the water used will also regulate the quantity. In Scotland, with very soft water and strong flour, long fermentation, and also using soft flour, 5 lbs. per sack. Each of these quantities has a marked difference in effect upon the fermentation. The question of the quantity of salt is important to guide fermentation and to give flavour. In a quick-working fermentation, and where the flavour of the bread is wanted to be the result of saccharine left in the dough, don't give more than 6 ozs. per bushel. In a long process, where extreme ripeness is wanted, 12 ozs. will not be too much. The natural effect of salt upon yeast is to check its growth, and therefore delay the working. Salt also preserves the tissue of the flour for a longer time before it loses its character as a mechanical mixture and becomes a chemical combination.

When we speak of long and short processes in relation to the action of differing quantities of the amount of salt required, we must, however, caution the reader to have in constant remembrance the fact that the amount of the ultimate change in the constituents of the dough *will entirely depend upon the quantity of yeast and the quantity of heat employed in either long or short processes and also in the mode of manipulation.*

If you refer to Blandy's modern processes, you will see that *a maximum amount of change is caused in a minimum of time by the use of a maximum of yeast and heat*, but that the quantity of salt is normally the quantity used in the old-time long, slow processes. The reason for this is in the fact that 2, 3, 4, and 5 lbs. of yeast has been used to accomplish in 2, 4, or 5 hours the same amount of change that the use of 6 to 12 ozs. of the older processes required from 12 to 20 hours to effect; for the different quantities of salt required by the differing modes of manipulation, you are asked to refer to various formulæ given in this edition.

The Flavour of bread is not the result of the type or quantity of yeast, or of the kind of flour used. Different flavours in bread result from different degrees of heat, of fermentation, the length of time the yeast is allowed in which to alter the flour, and assimilate the products of the change, the different percentages of albuminoid matter in the flour, combined with the length of time such albuminoid matter is subject to hydration by water and degradation by the action of diastasis; by the different quantities of salt employed in its making, and by the different heats in baking chamber to which it is subjected.

There are two broad divisions of types of flavour in bread, one caused by excessive use of salt, and length of fermentation with a small quantity of yeast; and the other by the excessive heat and rapidity of the fermentation, excessive heat of the baking chamber, and the large quantity of yeast.

"**Crumbliness**" is caused by over-ripeness, vigorous fermentation, excessive heat, or length of time in working, insufficiency of baking, and insufficiency of salt—these are the chief contributory causes. The kind of flour used has not much to do with it, and the other factors must all be present to obtain it. It occurs in this way. A plentiful quantity of vigorous yeast, with the stimulation of heat and plenty of food,—perhaps from added sugar, potatoes, or yeast foods—has been allowed plenty of time in which to attack the starch, and change large quantities of it into other and simpler compounds; diastasis and hydrolysis have also been at work, and the result is a wholesale decomposition of the constituents of the flour, separating them

into parts having no affinity with each other; and these being isolated, and albumen being practically absent, there is nothing to connect them; and the heat of fermentation commencing, and the heat of oven completing the evaporation of moisture—not all of it of course, or the atoms would fall apart like sand—and the absorption of some more of the moisture by the atmosphere as it gets cold and stale, produces what the baker calls crumby bread. Buy and eat of this bread, oh, ye suffering dyspeptics, for it is already digested, and a very small percentage of acid is present: for it is the halfway-house, at the end of Sweet Lane, and the beginning of Sour Street.

* * *

Harsh Flint-Crusted Bread, on the other hand, is caused by the reverse of this; the gluten undegraded, diastasis and hydrolysis have had no time or chance to work. The yeast, either deficient in quantity, health, or lack of time in working, has not helped the work of decomposition. The gluten, like thin sheets of gelatine—merely stretches and dries—and when cold, gives to the eater and handler a gum and hand-cutting crust, from which all bakers should devoutly pray to be delivered.

Dry Bread. Well, both of these are very dry breads; and dry bread, according to the degree of dryness and character, oscillates like a pendulum always between these two—more of one and less of the other; less of one and more of the other.

Sour Bread, when due to fermentation, is caused by over ripeness and not by uncleanness of either men or utensils, nor does it result from the use of bad materials. Extremes of temperature do not cause sourness; any system of fermentation, and any degree of heat, will cause it, if length of time is allowed sufficient for the purpose. Sour bread is caused by over fermentation, the result of the dough being allowed to work too long in the bread that is sour. Sour bread is caused by bad and ignorant workmanship, and by the exigencies of a commercial business; it being sometimes difficult to do that which wisdom prompts and which a scientific knowledge of the phenomena of fermentation points out at the time should be done. The operation by which sourness is called into existence is as follows: Yeast, by a peculiar property within itself—a ferment termed zymase—has the power when brought into contact with flour, of converting a portion of the starch into glucose and maltose, thus effecting a chemical change, and producing a new chemical compound. Having changed some of the starch into these gummy saccharine matters, it next proceeds to separate them in its digestive apparatus into three elements—carbon, hydrogen and

oxygen—breathing out as excreta during the process gas called carbonic acid (carbon dioxide), and alcohol. At certain stages and under fixed principles a fermentation is set up by the organisms producing putrefaction. There is further going on within the sponge and dough the action of diastasis, the enzymes, and also in the "order of nature" a development of decay in the yeast, and the usual accompaniment of decay, viz.: the work of microbes producing acids and putrefaction. These, in most cases, are simply symptoms and evidence of the senile decay.

There is a continuous onward change going on; and having united these great nature's forces, they will go on with their work; and not only will acid producing germs do their work, but putrefactive as well, until every atom in that sponge and dough is resolved into its ultimate elements and becomes again the gas, the acid, and the phosphate of the air and the field. Each of these changes is brought about by the action of some germ, but time does it. It is not more correct to say that they get in from the outside then to say that they are developed from inside, and only wait to be set free by processes of fermentation to begin to operate after their kind. And although it is doubtless true to say that certain acid producing germs produce the acid which sours our bread, *it will also be correct to say, that they themselves have to be caused, vitalized, born, before they can do it.* You cannot exclude nature's almighty incubator, the breath of life itself, viz.: oxygen; and where oxygen is there will be life.

Ropiness.

The primary cause of ropy bread is the presence of a microbic ferment within the dough, and is no doubt a development of the butyric acid ferment—*Bacillus subtilis*. This is the organism which produces a very uneatable kind of sour bread. And as in the case of ordinary sour bread, it must have a matrix to germinate in; old lined troughs, with cracks, worn corners, slimy, unwashed utensils, and a cold, slow fermentation, with a nearly lifeless yeast, will afford plenty of scope for this microbe in which to do his dirty work. Ropy bread, like sour bread, has a definite cause, which may be defined as insufficient aëration, and this insufficient aëration is caused by the lifeless character, or small quantity, of the yeast, combined with too cold fermentation, which does not give off *enough gas* to aërate the dough, and consequently, when this dead, cold, putrefying, mucilaginous mass is left a long time to rise, the other germs are at work, and when put into the oven, a crust is formed before the heat can properly drive out the moisture, and therefore the centre of the loaf does

not dry or cook, and presents a magnificent opportunity and bed for the growth of this microbe. This kind of disease gets worse and worse every hour after the bread is drawn out of the oven. It will not be until about six to twelve hours have elapsed that the putrefactive odour and taste begin to make themselves apparent. As I have already pointed out in the case of sour bread, all the conditions of ropy bread must be present before it will be possible to obtain it. There must not only be the lifeless yeast and the dirty trough, but there must be also a fairly strong flour to make a mucilage, and a long cold process.

Ripeness of Dough.

Ripe, overripe, unripe, are all intermingling terms. A dough that would be overripe for 2-lb. loaves is only ripe for rolls; or one that would be just ripe enough for very crusty bread, baked in a hot oven, would be overripe for very crummy bread; and if this crummy bread happened to be put into a cool oven, it would probably develop a bad flavour. Therefore heat of oven and size of loaf are very important items to consider during the day's baking. Heat decomposes acids, and the acid of a ripe loaf is increased or decreased accordingly by different temperatures of oven, and the crust will always be sweeter than the crumb of a ripe loaf for that reason.

The Causes of Holes in Bread.

Holes in bread are caused by the action of heat upon the undegraded pieces of gluten, upon small patches of imprisoned gaseous vapour, heat causing expansion in both cases. The undegraded gluten is the result of insufficient fermentation, and the imprisoned gas the result of pressure from which the dough has not recovered before going into the oven.

All bread will have more or less holes, and these will vary in size as well as in number according to the mode employed in the making. Holes in bread are the result, in the great majority of cases, of careless workmanship, sometimes from a backward, unripe dough.

Doughs made from different grades of flour, by different modes of working the fermentation, or from faulty flour and yeast, will have different degrees of physical strength, of the tissue of the flour, or the vigour of the yeast. When this is so, they will require different handling during the process of making up, light or heavy as the case may be.

The chief place in the process where the moulder increases or diminishes the number and size of the holes, and where his skill comes in most conspicuously is at the oven, or where the loaf receives its final moulding.

If the loaf is to be taken from you and put into the oven at once, mould it with as few turns and as lightly as possible, and also leave the spring in it. If the loaf has to stand and prove before going into the oven, mould it clear and firm, but still leave some spring in it. Never mould and grind the loaf in moulding till its spring is gone, and its tissue is destroyed, and it is soft and dead, if you do, then there will be holes, and rough moulding has caused them. We seldom see holes in very sour bread, and sour bread is the result of too much working, and therefore the more holes and the larger the holes, if there are many of them (a large hole, or two or three holes, may be caused by moulding), will show insufficient fermentation. The expansion of unevenly distributed gas and undegraded gluten is seen to be the cause; also, when a part of the loaf next the wall of oven (the crusty side) is cut, it will be seen to have more and larger holes than the part not so much exposed, showing that heat has caused the expansion. One or two large holes in centre show that the tails of the closings are too large, too dry, and too hard, and could not expand as evenly or as easily as the other part of the loaf. This sort of hole is also caused by the heavy bash fixing the head on. When there are several holes distributed over the loaf, it has not had time enough in which to recover the handling; but an experienced, careful ovensman can tell by the feel if the loaf is free enough, and can arrange accordingly. If he knows his work, he must know as soon as he handles the loaf whether it is at liberty and ready or bound up. If it is bound up and has any life in it of either gas or gluten it must burst out somewhere, and usually it is towards the top, because the heat can get full play upon it, the sides being more or less protected by the other loaves. Roughly classified, there are three kinds of holes: 1st, caused by insufficient change in dough; 2nd, by being put into the oven with too much spring in it; 3rd, clumsy, rough moulding.

SEVERAL TYPES OF BREAD AND HOW TO MAKE THEM.

I WILL now give a few processes for making a batch of bread with any one of the well-known standard brands of dried yeast, which recipes will cover the ground from the lowest or weakest type of home-made bread fermentation up to the highest or excessive fermentation for well-piled bread. These recipes are in use in Ireland and Scotland as well as England:—

EXAMPLES.

I. Farmhouse or "Home-made" Bread.

280 lbs. good white flour; 1¼ lbs. yeast; 14 lbs. potatoes; 2¼ lbs. salt; 56 quarts water; ¼ lb. sugar. Set a ferment—at 84 to 90 degs. (Fahr.) according to the weather—with the yeast, potatoes (boiled and mashed), 6 lbs. flour, and about 20 quarts water; it will work from two to four hours. Directly this ferment is ready, strain it into the trough, with the remainder of the water and the salt and sugar (the water must be warm enough to make the dough about 80 to 90 degs. when all the flour is in it), and make up very lightly into a light firm dough. Give this dough three hours in the trough, and then throw it out, scale off 2 lbs. 3 oz. for the 2 lb. loaf, hand up the scaled pieces of dough with plenty of dust, and let it prove very much; when it is full proof, mould it up lightly (dry with dust) with a very small top, turn the bottom upside down before you put the top on, so that when it is in the oven it will break open roughly; as soon as it is moulded put on the top, mark it with a stamp and put at once into the oven. Of course any sort of oven will do, but to be proper, it should be put into an externally heated oven with an iron plate for a bottom. The oven should have plenty of top heat and very little bottom.

II. Silken Piled Well-fermented Bread.

Two bags of flour (280 lbs.), which should be about half soft roller "whites" or "supers," and half good strong flour; mix them well together in the trough, put the pin-board in, and make a bay large enough to stir a sponge with a third of the flour; be sure and press down the flour all round the back of the board to keep the liquor from escaping. Boil and mash 12 lbs. potatoes, mix them with 35 quarts of water hot enough to bring the sponge to 84 degs. (Fahr.) when the flour is in. Strain these 35 quarts of water and the potatoes in the bay, carefully and thoroughly dissolve ¾ lb. of yeast into it, and ¼ lb. of salt. Stir into a stiff batter sponge, just firm enough to enable you to put your hands under it and flap it over. Do this several times to make it tough, dust it a little, put some labour into it—either with sponge stirrer or arms, only do it well—and then leave it to ferment until it rises, breaks and falls, which will be in about eight hours. As soon as it begins to subside pour into it 25 quarts of water—95 degs. (Fahr.)—and 3¼ lbs. salt; mix all together and make into a nice clear dough with some spring in it. To get this spring and toughness, put plenty of labour into it, cut it back, turn over, and knead well; let it prove

two hours, and then, if ripe enough, throw out, scale off, and hand up firmly into boxes. Give these pieces fifteen minutes in the boxes, and if they are free and lively, mould into oven if for "packed" crumby bread; but if for crusty, mould and prove them in boxes before putting them into oven. *Note.*—In this example there should be enough salt to check and season the excessive fermentation, a good tough sponge to give the yeast plenty of work, and good glutinous flour, because it is the flour that makes the silken pile, not the workmanship.

III. Light, Crisp, Crusty, Cottage Bread.

For 280 lbs. fine white flour, put in a ferment with ½ lb. malt extract, 2 lbs. flour, ¾ lb. yeast, and 20 quarts water at 86 degs. (Fahr.); let this ferment be in the tub until it subsides, then strain into the trough with the pin-board in. Add 20 quarts more water at 84 to 90 degs. (Fahr.), and with about 56 lbs. of flour stir a batter "flying sponge"; let this "come up" once, which will be in about two hours. Then dissolve in 16 quarts warm water 2 lbs. salt; stir this into sponge, and make a dry firm dough, which will be ready to come out of the trough in half-an-hour, and will usually prove quick enough to require following up—if the bakehouse be warm—as fast as the smartest of bakers can work. This dough should be baked in a sharp oven, and if light and well proved, 2 lb. loaves will, as a rule, bake in forty-five minutes from the time the oven door is shut. *Note particularly.*—No liberties must be taken with this dough by letting it lie about after the sponge is stirred, every stage should be watched and followed up quickly, and then you will have handsome bread of a delicious flavour—that is, if the flour is good. And further, if you have a large staff of helpers and plenty of oven room, this is a very desirable mode for pushing through a few score bushels nightly, without any waste of time.

IV. Suitable for Small Bakers.

To make several kinds from one batch: 1 lb. yeast; 280 lbs. flour; 56 quarts water; 3½ lbs. salt; ¼ lb. sugar; put in a sponge with 40 quarts water at 90 degs. (Fahr.), according to weather; put the pin-board into one end of the trough, to form a division large enough to hold this; having well fastened the board with flour, strain the liquor into it, add the yeast carefully dissolved, the sugar, and about a bushel of the flour. Stir into a batter sponge, and leave to ferment six to seven hours, or until it subsides, then dissolve 3½ lbs. salt in 16 quarts water, 96 degs. (Fahr.), mix up with the sponge. If you want a few French rolls, dip from this

sponge into fine flour and make rather weak, or if a few tight dough, or small fancy, make tight. If you make only a few brown loaves, this sponge will be but a little thicker than a ferment, and will make good brown bread if dipped into good meal. Vienna: to make nice, rub a little butter into fine Hungarian flour, dip enough of this thin sponge into it to make the quantity you require. The remaining portion of sponge should be made up and left to prove for half-an-hour, just time to get a cup of tea and a snack, then begin to weigh off and mould all that are to be baked with the batch. The few twists and rolls should be made up, and be baked after the batch bread comes out, because they must have a hot oven. Batch tea ("tough") cakes and all very small rolls baked upon tins must also be baked afterwards in warm oven. Of course, to make six or eight different sorts and sizes of bread off one ferment, and bake them all off before deterioration, will mean smartness and judgment; but there are scores of small bakers who have to do this, and they frequently make bread this way that would compare favourably with that made in the larger shops. If the rolls, &c., are baked off first, the doughs for them should be made as quickly as possible, covered up and kept warm. In moulding always get up the small bread first. In filling the oven put in the largest and closely packed bread first, these will take more time to bake. Twists, small rolls, &c., should be proved with steam. If you have no proving cupboard, put a pail of boiling water into the trough, fit sticks to the same, and put the rolls over the water.

V. Good Housekeeper's and Farmhouse Bread.

To make one peck of flour into bread: Put in the sponge when you are preparing to go to bed, with the following quantities: 2 quarts of warm water (not hot), teaspoonful of sugar, about half of the flour, and 2 ozs. yeast; stir these into a sponge in a pan large enough to allow room to rise to double its initial bulk, put this into a comfortable corner, with a stick across to keep the cloth out, cover up and leave until you get up. In about eight to twelve hours from the time the sponge was put in, make the dough, add another quart of warm water, 2 ozs. salt, well mix them and make into a firm dough. In about an hour it will be ready to mould up for the oven; keep it warm.

VI. Small Fancy Bread for the Stillroom Maids.

At bedtime, put in a sponge with one quart of half milk and half water, (if the weather is cold) as warm as you can comfortably bear the back of your hand in, not quite 2 ozs. yeast,

teaspoonful of sugar, and enough fine flour (as good as the establishment contains, fine Hungarian if possible), to make it into a nice batter, stir well and put into a comfortable corner to ferment until you get up. The pan must be quite a gallon size. As soon as you come down in the morning weigh and powder 1 oz. salt and sprinkle over the top of the sponge; add half pint warm water; rub 2 ozs. good butter (fresh if you may use it) into enough flour, and make the sponge into a nice firm smooth dough, cover this up to prove; if it has got cold you must warm it up carefully by putting it near the fire, but don't partially bake it. When it has risen, mould it into the rolls you require, well prove (rise) before baking, and bake in a nice hot oven. This will make almost any kinds of rolls for breakfast. Add sugar, or eggs, when preferred.

VII. Vienna Bread: Baker's.

Quantities.—1 bushel fine Hungarian flour; ¼ lb. sugar; 6 ozs. yeast; 4 ozs. salt; 12 quarts water. Stir a good sponge, but not tight or firm, with 8 quarts water, 90 degs. (Fahr.), yeast, sugar, and sufficient flour. Allow it to rise and subside, which will be in about four hours. Then dissolve the salt in three more quarts of warm water, break into the sponge, make a tough but not hard dough; give it a good proof in trough; it will move quickly when ready to throw out.

For crescents use 2 ozs. fresh butter and ½ oz. powdered loaf sugar to the pound of dough, and 2 ozs. yeast to the quart; work in carefully, but don't make it too stiff. The queen's bread should have an egg added to this quantity of butter and sugar. The crescent, queen's, and twist dough will require to prove an hour or two longer than the Vienna dough. For dinner rolls, break eight out of 1 lb. dough; penny rolls four out of 1 lb.; twopenny rolls, 10 ozs.; threepenny, 1 lb.; sixpenny, 2 lbs.; Crescents and queen's, six or eight out of 1 lb., according to neighbourhood and credit.

VIII. Vienna Bread: Small Bakers and Hotels.

Quantities.—2 ozs. yeast; 1 quart water; 1 quart milk 1 oz. sugar; 1 oz. salt; and 9 lbs. finest Hungarian flour. Put in a sponge, with the milk and water at 90 degs. (Fahr.), yeast, sugar, and flour to make a batter sponge. Let this rise and fall, and then make the dough. Powder the salt on to the sponge, and mix in with enough flour to make a light dough. It will be ready for moulding in an hour.

The Glazing of Vienna Bread by Steam.

The glaze upon Vienna bread is the same, and produced in much the same way, as the glaze upon cracknel biscuits. The ordinary suet dumpling also, if it were put into a moderately hot oven and baked immediately after coming out of the pot, would shine just the same. The boiling water in both cases acts upon the surface of the dough, and converts the starchy matter of the flour into a gummy substance called "dextrine," which is the gum or mucilage of commerce, and is produced by the action of heat upon starch. The starch is first gelatinized by the steam, and then by heat set in a hard glaze.

The baker will therefore perceive that there are two things necessary at the outset of this glazing—viz., heat and moisture. This will be effected by putting a moist surface-dough into a dense body of "wet" steam, which will "dextrinise" and soften the surface; and then the heat of the oven will set this fast in the form of a polish upon the crust during the baking. It will be best, perhaps, to give directions in detail how this is to be accomplished. When the loaves or rolls are moulded, put them away out of the draught. Make the oven hot, but not rash or scorching, as that will not only colour the rolls too freely, but probably destroy more steam than there is to spare; nor must the oven be a cold dead heat, because then there will not be enough disengaged heat to catch and rapidly set fast the wet surface with which the steam has covered the dough. While the rolls are proving, and the oven is heating, the steam also must be "getting up" in the boiler.* Any quantity will do; as a rule the more the better—from 40 lbs.; not dry steam, or hot vapour, but wet steam newly generated from a good body of water, the boiler being half or two-thirds full. Arrange to have the oven, steam, and rolls, all ready at the same time; then wash the rolls over with a thin paste or wash, by scalding a little flour with boiling water; turn about 15 to 20 lbs. of the steam into the oven, and then, with the steam still going into the oven, cut the rolls and put them quickly in, and shut the oven-door, closing every aperture that would let the steam out. *Note particularly.*—The rolls must be put into the steam, because, if the surface be allowed to get dry in the oven, it will be next to impossible for any amount of steam to cause a polish. There may be plenty of steam available, in which case shut it off after the bread has been in the oven a few minutes.

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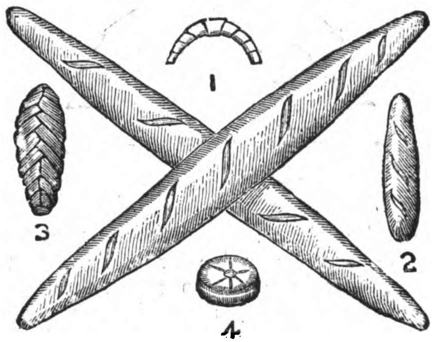
*Werner, Pfleiderer and Perkins have introduced into their "Telescocar" Drawplate Ovens an improved steam generating apparatus, by means of which Vienna Bread can be perfectly baked in these Ovens.

VIENNA BREAD SHAPES.

1. *Crescents or Kipfels* (English, see "Bread Recipes"). *Vienna Kipfels* (see "Crescents"). The *Milch Kipfel* is made from ordinary Vienna dough and baked as crescents. The *Salts Kipfel:* Shape up (from) Vienna dough, wash over with milk, and dip them in course table salt and caraway seeds; tin and bake as the others. 2. *Lutter Struyzel* are made and baked as Vienna bread. 3. *Mohn Struyzel*: Make two long cords or rolls, as for ordinary rolls; lay them across each other in the cen-



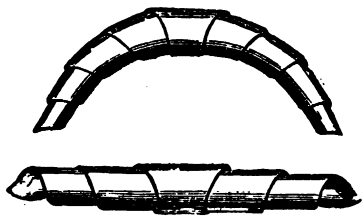
VIENNA BREAD SHAPES.

tre, there will then be four ends; plait all four; put on tins and prove; wash with milk; cover with poppy seeds (Mohn); bake as usual. 4. The *Kaiser Semmel* is made from Vienna dough proved and baked as usual. The shaping of them is rather difficult. We have adopted a new and quicker way of shaping in London. Ordinary round rolls are cut, not straight across, but from the centre five times, of equal distance. The German mode: Take the roll, flatten it, and fold a fifth of the outer part over towards the centre and following each other, striking each fold to keep it in its place when baked. The fifth and last fold should be pushed neatly under the first fold, forming a star or rosette.

Crescents

are also made from Vienna flour. The operator proceeds as for Vienna rolls; but when the sponge is ready, *works into each lb. of dough* 1 *oz. more butter, and a teaspoonful of white sugar. This dough must be made much firmer than the former, on account of the shaping.* It is covered up, and put aside for about an hour, and is then ready for moulding. Weigh off into pieces of about 2 ozs., and roll out to about the size of small cheese-plates,

keeping them constantly *covered with a slightly-damped cloth* as far as possible throughout the moulding. This is very essential in all fancy breads, as it preserves what is called the "bloom," which is caused by a moist surface engaging more of the oven heat than a dry surface. The round piece of dough is now pulled slightly out to an oval shape; then one of the narrow ends is taken on the thumb, and rolled or folded outwards, care to be taken that the centre is pressed with the two forefingers as you proceed, pushing them from you: the shape would otherwise be too bulky in the middle. Now press the ends downwards into



CRESCENTS.

crescent or horse-shoe form; place them upon a baking-sheet or flat tin; put aside to prove or rise for half-an-hour; then lightly touch with milk, as for the Vienna rolls; bake in a "sound" oven, and, if possible, put into plenty of steam. If care is taken in the shaping and proving, a pretty and appetizing breakfast roll will be the result.

Queen's Bread.

The sponge and the dough of Queen's bread are similar to that of the crescents, with this exception—that an egg is added (the quantity of 8 lbs. of flour being still retained as the basis). The dough is also worked firm as before, for making into shape. Weigh into 2 oz. pieces, make into balls, and, after allowing to stand for about five minutes, roll into lengths of, say, 8 inches, under the palms of the hands. Then shape into knots, twists, S's, etc. They admit of a variety of shapes, according to taste, and must be proved, washed, and baked as crescents.

Scooped-out Rolls

are designed for the reception of potted meats, and are made from the same dough as crescents, but *without sugar.* They are weighed in 1 and 2 oz. pieces, and moulded egg shape. The part that forms the closing or join of the roll is placed upon the tin, to preserve the shape. They should be well proven and well baked. The bottom is then carefully sliced off, and the inside cleanly scooped out and filled with mince or potted meats, and the bottom or lid re-fastened upon it with white of egg.

Sandwich Rolls

may be made of the same dough. Take a piece, and roll out very thin (to about the eighth of an inch); cut it into halves; dust the space between with rice or fine flour. Lay one piece upon the other, put upon tins, and cut them through to the size required, but without disturbing the whole; then put aside to prove. Wash with milk as before; and bake in a sharp oven. When cold, the squares are parted from each other, and then the halves or layers are easily separated. Spread with potted ham, etc., to taste, and put together again.

"Brioche:" a Rich French Bread.

1. Prepare mixture as follows: ½ pint milk; ¾ lb. butter; 1 oz. sugar; ½ oz. salt; 6 eggs; 2 oz. yeast; and about 2½ lbs. fine Hungarian flour. Make the milk warm, mix with it the sugar, yeast, and a table-spoonful of flour: set this to ferment for an hour, then break the eggs into it, powder the salt, and rub the butter roughly with flour, and well knead the whole mixture into a smooth, firm dough. Put this dough away to prove for two or three hours, then knead it up again and weigh into pieces of 2 ozs. each; mould into cottage-shaped loaves, with a very small top, place upon tins to rise, and bake a rich yellow colour. Before and after baking wash over with egg.

2. There is another Brioche, for kitchen use, prepared as follows: Mix half the above quantity of sugar and milk with the yeast, and ¼ lb. flour, and ferment as above; then rub the butter with the powdered salt, add the eggs and about 1 lb. of flour, and knead the whole mixture into a firm, smooth dough; spread it out upon the board, and lightly dust with flour; knead it, and put away to prove for four hours or more, to suit convenience in making up. To lie all night will not harm, but rather improve it. When well risen, knead it up, and it will then be ready for use. It should be moulded in one loaf, same shape as the smaller ones, notched round the side, and put into a cake-tin to prove for half an hour; wash over with egg, and bake in a moderate oven. This *brioche* paste or dough can be used for ornamental shapes, or to encase fruits, preserves, etc.

Vienna Rolls for Hotels, etc.

The following recipe may be relied upon to produce a satisfactory result. About 8 lbs. Vienna flour will be a convenient quantity to work up. For this, 3 ozs. fresh yeast will be required, 2 ozs. good butter, with 2 ozs. each of salt and white sugar, and ½ lb. potatoes, peeled, boiled, and mashed fine. Place 2 quarts water and ½ pint milk, warmed to blood heat—or 90

degs. (Fahr.)—in a large bowl or pan, which should be free from grease, and mix into it the yeast, the potatoes, the sugar, and about 1 lb. of the flour. Put away this sponge in a warm place to ferment for about three hours. When it settles down, or "drops," it is ready; but may stand another hour or two, if necessary, without damage. The powdered salt is now mixed into the sponge; the butter is taken and carefully rubbed into the remainder of the flour, which is then mixed with the sponge, and the dough is to be made soft; flour may be added if necessary, but with care. It is now put away to prove for another hour; then lightly folded together, using a little flour or ground rice to keep it from adhering to the board and hands. Weigh into pieces of ¼ lb., ½ lb., or 1 lb.—the usual size for these rolls; make them round, cover up for a few minutes that elasticity may be restored, then mould them into oval or egg shape, the larger ones to be made into long rolls with pointed ends, which is done by folding over and over inwards towards the moulder, pressing with both thumbs on the centre of the dough, until the ends are gradually worked out to the requisite length of 3, 6, or 12 inches, respectively. They should be put away in a drawer or cupboard to "prove," or rise, for half an hour, and are then ready for the oven. It is usual, before putting them into the oven, to cut or score the top three or four times slantwise (see engraving, p. 141), and, if washed over with a little milk, a fine golden hue will be imparted. They should be placed upon the bottom; if not, use a baking-sheet or tin; but the oven must be of a good heat, though not rash or scorching. These rolls must be baked crisp.

The Vienna roll dough will also make excellent French rolls and tin bread for sandwiches and toast. These are to be well proved in tins made for the purpose, and baked crisp in a sharp oven. The French rolls are rasped.

To Make Six Bushels of Bread with Brewer's Thick or Compressed Yeast.

Set the ferment as follows:—Boil and mash 14 lbs. potatoes, or ½ lb. yeast food; add 4 quarts water, and strain into a tub; when strained, test the heat with a thermometer, and use hot or cold water to make the whole about 90 degs. (Fahr.); well mix into this 1 lb. flour; and then pour in 1 quart yeast or 1 lb. compressed brewer's yeast (dissolved), stirring it round once or twice; cover up the tub, and allow to ferment five or six hours. The ferment must not be moved or shaken until it is ready—that is, until fermentation has begun to subside, and the ferment is going, or has gone,

down. When ready, add 7 gallons water (heat, 86 degs. (Fahr.) when flour is in), strain into the trough, and mix into it enough flour to make into a tough, dry batter; pin this up into one end of the trough; let this sponge rise and fall, or incline downwards, twice—usually it will take about six hours; when the sponge is ready, dissolve 3¾ lbs. salt in 7 gallons water 80 degs.); pour this into the sponge, and mix all together, breaking the sponge smooth with the salt liquor, then make into a stiff dough, quite clear from scraps and dry flour; give it plenty of labour to bring out the gluten; allow the dough to ferment until it is full of gas, then cut into pieces, dust lightly with flour, knead and fold it well together, throw it out of the trough, weigh off, hand up, mould into loaves, prove, and bake in a good "sound" oven.

To make Six Bushels with Dried Yeast without Potatoes.

58 quarts water, 280 lbs. good flour, 2½ lbs. salt, ¾ lbs. yeast, 2 ozs. sugar. Put in a sponge with half the water, yeast (dissolved), sugar, and enough flour to make a sponge, about 84 degs. (Fahr.); and let this lie about eight hours, until it rises and subsides. When it begins to go down, dissolve the salt in the remaining water (warm), add ½ lb. diastase, and make a good dry dough; prove two hours, then throw out. Scale off and let it prove a little, and then mould. These alterations are necessary because of the improved quality of the yeast now, and potatoes to assist further growth of yeast is unnecessary.

To make Six Bushels with any of the Flour Barms on the Scotch System.

Use 8 quarts barm, 60 quarts water, half sack of soft mellow roller supers, and half sack good patent process middlings, mixed together, and 4 lbs. salt. These quantities are the same for *half* or *quarter sponging*.

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Half-Sponge.—Stir a stiff sponge with half the water at about 84 degs. (Fahr.), the barm, 1 lb. salt, and sufficient flour for the purpose. This should have about twelve hours to ferment, then break into it the other water, in which 3 lbs. salt have been dissolved, and make a weak dough; let this prove until full of gas and it tears short; then throw out, scale off, mould, prove, and bake; or if for crumby packed bread, put into the oven direct from the moulder's hands. It is usual to brush the sides and ends with melted lard.

Quarter-Sponge.—Stir stiff batter in a tub with 8 quarts barm, 12 quarts warm water, ½ lb. salt, and sufficient flour; this will be ready in about 10 hours. Then break into this 40 more quarts water and 2 lbs. salt; turn it into the trough and make a nice springy sponge; this will be in three or four hours. When it begins to subside mix in 6 more quarts water, and 1½ lbs. salt, and make into a tough, light dough, using plenty of labour. Watch this dough—if the weather is warm it will fly; don't let it get ahead; follow it up quickly. *Note.*—In working with flour barms you have already generated a good body of yeast and gas in the barm, therefore use plenty of "pickle" in the later stages. The sponges are the most particular part. Stir tough, not hard and tight, but spongy sponges, a stiff batter that will bear your arms to take some up without breaking. Join your hands together under the batter, and flap it over and mark it across two or three times, as our "Jock" used to say, "to keep the witches out," dry-dusting every time. It is now becoming customary to use a little distiller's compressed in the last stage of the process, which points to the early substitution of distiller's compressed in the place of Parisian. If it is found useful to use a little to help the Parisian, why not use it altogether, and let the risky, troublesome Parisian go entirely.

Scotch Bread and Cookies.

There are several kinds of these cookies and bread which English, Welsh, and Irish will find it commercially useful to imitate. London, Dublin, and other large towns will find a ready sale for the halfpenny cookies. The Scotch pan and plain bread is very much superior in fineness of texture and volume to that of English and Welsh towns, though Ireland has not much to learn in this matter of fineness and bulk, perhaps rather, like Scotland, just a little to unlearn, and for this reason their mode of making is not reproduced here: it is so wasteful of time, of labour, and of nett profit. Nor is the temperature of the water given. It is dangerons to do so; it is the base of all, but it is a base that can only be laid down in the identical spot, the strength and temperature of the flour, and heat of atmosphere inside and outside, are factors which must be known before doing so.

The formula for plain, pan, and "French" here given is designed to meet the needs of those who sponge or make dough overnight for use in the morning; and to those who have read the articles upon straight doughs, the seven phases in the life of a loaf, and yeast functioning, herein, it will be apparent that the twelve hours in the dough stage is not arbitrary to the pro-

cess, but can be quite safely reduced to six or eight hours. For those who find that time more convenient by an increase of heat and yeast, it will be only necessary to point out to the practical workman that this straight-made dough is merely a tight sponge with more salt than usual in it, and the temperature, if it is increased about 5° over that of the sponges they are in the habit of stirring at any time of the year, the results will be near enough to guide them to success after a trial or two. It will be noted by Scotchmen that the quantities given are the same for French, pan, and plain. The reason for this is that it does not appear necessary in breads of the same type in volume and texture to have different processes in making up. Scotchmen themselves do not make their French of equal firmness, but weaker or firmer to their own taste. The only difference necessary is not in the quantities but in the qualities of the flour used, and the addition of lard to the French. (Do please use best English or Irish lard, not the strong flavoured American, it is quite nasty in some of the cookies.)

Formula.—Make up a straight dough with 280 lbs. of flour (quality to suit price and kind), 1 lb. malt extract, 1 lb. distiller's yeast, 4½ lbs. salt, 60 quarts of water (15 gallons of 10 lbs. each), and, if for French or pan bread, 1½ lbs. of melted butter or lard. Separate the yeast in a little of the water with the malt extract, dissolve the salt in the other water and then make the whole up into a clear dough. Cover up and leave to ferment for 12 hours. Then dry, dust, and knead well, and throw out of trough. Scale off, hand up, give it time to recover, and then mould into the shapes required.

Mould the loaf into a compact roll of about 10 inches in length, pass the grease brush round them, and then place upon a baking sheet quite closely. Upset them all round to keep in shape. Prove well, and bake.

Cookie Rolls are made by taking a piece of the sponge off (when ready) before the salt and water are added, and then rubbing into it sugar and butter or some other fat.

For No. 1, called **Plain Biscuit**, add to each pound of sponge 2 ozs. fat, 1 oz. of sugar, and dry up into dough with soft white flour. Let prove two to three hours; weigh off 2 ozs. for ½d., roll out like the ordinary batch or coffee-shop tea-cakes, and prove well in boxes. When ready for oven, put upon tins, and then dock in middle with a small docker, and bake.

No. 2, **Plain or Currant Cookies**: 1½ ozs. fat, 1½ ozs. sugar; rub in, and dry up into soft dough (like ordinary bun dough). Prove three hours, scale 2 ozs. for ½d.; roll round, flatten to about 4 ins.; place upon tins, put a bow of short-

paste upon top; prove in steam-press very light, and bake lightly like a bun. Before putting on the paste wash with a mixture of egg and milk. This round roll, also notched as a star from centre to side, like the old Scotch bun, washed over, proved and baked, is also a nice cookie, and if a few currants are mixed into this, so much the better for a change.

No. 3, the **Hand Roll**, is made the same as for No. 4 dough, but moulded and rolled oval and flat, and then cut 5 times one end to represent fingers, washed over, proved well in press (upon tins), and baked as for buns.

No. 4, the **Victoria Roll**: 1 oz. fat to 1 lb. sponge, rub in, and let lay three hours; weigh 2 ozs. for ½d., pin out the piece oval to about 4 ins. in length, then fold over one end to make a half-circle turnover. Put upon a tin, wash over, prove well, and bake as a bun. This roll, when nicely made, looks very well; it rises in the oven like an oval puff, and is light and nice, in fact, they are a really fine, big, good-looking halfpennyworth, and cannot fail to sell well. Try them.

Blandy's Fancy Tea Bread.

Make a sponge with ½ lb. sugar, 1 lb. flour, 2 ozs. yeast, 1½ pints milk (90 degs.); when it subsides add ½ lb. warm butter, 2 lbs. flour, and 3 eggs; make dough, and allow to rise one hour; then make into 2-oz. size a number of fancy shapes, prove, wash over carefully with yolk of egg, and bake in a sound oven.

RECIPES—CAKES, PASTRIES, BISCUITS, FLOUR AND SUGAR CONFECTIONERY.

POCKETS control pulses and palates; but don't imitate best goods with common materials. This destroys the confidence of the public and lowers the trade. Make cheap goods in new shapes, and different mixtures. There is room for the ingenious here; imitation is not good or clever.

I have endeavoured in the following collection of recipes to cater for every ordinary want of the ordinary baker, pastry-cook or confectioner, ship's baker, and *restaurateur*. Usually there are general characteristics that apply to the varieties of the same class of goods, and I have given at the beginning of each class some general rules to be observed when preparing that kind of goods. It will be useful, therefore, when working from these recipes to go back to the commencement of the section or class from which the recipe is taken, to see what hints are there given

for this kind of work. This will enable the worker to get better results, by inviting him to always *prepare his goods with brains.* Try and find out the principles which underlie the cake or biscuit, etc. Don't work like an automaton. I have not given in the recipes the weights, or prices of goods to be sold at, this must be gauged by the expense of raw material, labour, and other expense. Ascertain the gross cost of production and distribution, and put on 25 per cent for gross profit, or to suit the system of cash or credit or other special features, but do not starve the maker for the benefit of the buyer.

To Cream Butter for Cakes.

It is most important in making nearly every kind of cake, that the butter and sugar be creamed previous to the eggs going in, and that the eggs be put in one or two at a time and beaten before the others are added. In cold weather the danger is that the cold eggs will set the butter and refuse to amalgamate with it, and what bakers term curdle the mixture; therefore the butter should be slightly warmed before and during the time of beating, to make it cream or work up quickly and lightly, and the eggs should be stood for a few minutes in warm water to take the "chill" off and help the albumen to expand freely. The danger to be avoided is the melting of the butter into oil, and then it is impossible to get enough air into it; or to expand the egg and make it light and frothy; the thin oily butter continually falling upon these small air-balloons, as it were, breaks or allows them to escape out of the mixture; also *note*, that after the egg is beaten, there is a danger of destroying some of these said air cells that have been formed; therefore in adding the flour, etc., to a cake after beating the eggs, never work it about more than is barely necessary to incorporate such flour or other ingredients; handle the mixture lightly and quickly, but don't be afraid of putting plenty of labour into the creaming or preliminary beating of the eggs, sugar, and butter; the more beating the lighter the cake.

This lightness of handling as well as speed in working off must be more particularly observed, when the lightness of the cake depends upon the effervescence of gas from baking powders. If a cake is poor and has to depend upon this gas for its lightness, and either by roughness of work or waste of time the gas escapes, there is very little hope that it will be light. It is sometimes difficult to get all the eggs into rich mixtures without curdling; a handful of the weighed flour thrown in while beating will obviate this. Whenever baking powder, carbonate of soda and cream of

tartar, are used in cake making, they must always be sifted and well mixed in the flour; volatile (ammonia) must be powdered and beaten up with the mixture, or dissolved in the milk; but it is not necessary to hurry it into oven, as moisture does not decompose it as it does the other acids and carbonates. It is disunited, and gas is evolved by heat of oven.

[*Baking Powder.*—In the recipes, where baking powder is mentioned in this book, it invariably means the recipe in the list as Baking Powder No. 1.]

Test the Eggs.

Eggs form so important a part in the preparation and successful turning out of the goods that each egg must be tested. One musty egg will spoil the largest mixture beyond remedy; therefore crack and smell each egg separately. A thin, watery egg will not injure the flavour; but where lightness or strength are required the eggs should be *quite* fresh.

Get the Ingredients Ready.

In making up goods always get the ingredients ready. Before beginning the preparatory beating, etc., see that the cake-tins, hoops, or baking tins are ready; currants, etc., washed, picked, and weighed; peel cut; flour, butter, sugar, eggs, all weighed; and then the mind will be left clear to work out the necessary formula and directions. Also be sure and watch the process in every stage; be most careful about small details, such as the flavouring, baking, sending up or displaying; and above all, beware of dirty pans or cooking utensils, and grit in the fruit.

Spice in Cakes, etc.

Nearly all those flavourings that come under the head of spice, if used in cakes, buns, and biscuits in very small quantities, generally improve the palatableness and aroma. Spice is harmless to the majority of persons, and in nearly all cases is considered a great improvement, though it has of late become unpopular with delicate persons and palates, owing to its having been used in certain dishes with too free a hand. This is to be regretted, as sometimes it saves a dish from being positively insipid. Few would think of objecting to the delicate flavour imparted to their custard by the addition of a bay-leaf, or a piece of cinnamon, or to the clove in their apple-tart; but if through the ignorance of some cook our tart has been spoilt by the addition of twenty cloves instead of three, or the custard appears to be only a dish of bayleaves, shall we, for that reason, universally condemn the use of these extremely useful flavourings? The same may be said of mace, nutmeg, and all the tribe of spices.

not even excepting the much-abused pimento or allspice. The addition of a few drops of mixed spice to any fruit-cake mixture or buns, or of powdered cinnamon to the Madeira, or of nutmeg and a glass of rum to the Genoa cake, will improve them. Having said this much, we leave the matter of the use of spice to the tastes and discretion of our readers. Essence of spice is preferable; it does not discolour the goods.

Sponge Cakes.

1¼ lb. eggs, 1 lb. flour, 1 lb. castor sugar, and about 4 drops lemon essence; or ¾ lb. sugar, ¾ lb. flour, and 1 lb. eggs. Put the eggs and sugar into a pan large enough to allow room for whisking without waste, then well whip for about half-an-hour—if a machine is used, from ten to fifteen minutes will be long enough—passing the whisk through the mixture always in one direction, not backwards and forwards, nor with a chopping, jerky stroke, but with a regular motion from right to left, bringing the whisk over to the right again, forming a circle each time. Do not stop or rest from whipping the mixture until quite ready, because the air cells that have been formed by the rapid beating, being extremely fragile, will collapse, the expanded and separated albumen of the eggs go together again, and the mixture become leathery and heavy. If unable to sustain the exertion so long, ask a companion or fellow-worker to give you a few minutes' rest by taking your place. Whether in bakehouse or kitchen this will be cheerfully vouchsafed. At the end of the half-hour it will be ready; add the essence of lemon, stirring once or twice, and having previously sifted the flour carefully and lightly, mix. Great care must be exercised in mixing in the flour, as every motion of the spoon in its passage through the mixture destroys some of the aforesaid air-cells, and the more it is stirred the heavier it will become. As soon as the flour is mixed, it should be put into the moulds or frames (previously prepared), and baked in a sound oven that has been made hot and allowed to cool a little. The smaller sizes should be dusted on the top with castor sugar when in the tins. They bake very quickly, and must be watched.

To prepare sponge-cake tins: Wash well, dry thoroughly, then grease with the following preparation—¼ lb. beef suet, the same quantity of lard; melt, and add a table spoonful of flour; when cool enough work it with a paste brush into a froth, with which grease the tins. If the tins or moulds have awkward angles or recesses that the brush will not reach, the grease must be poured in while warm, and the tins turned upside down to drain. Having greased the tins, sift over them some fine castor sugar through a fine hair sieve; turn them upside down, and slightly knock the

loose dust out, only leaving enough to cover the whole of the inside with a smooth white surface: if the grease or the sugar is put on too thick or allowed to settle in the corners, when it is put into the oven this part will burn and spoil the appearance of the cake.

German Sponge Cakes.

½ lb. sugar, 10 eggs, 6 ozs. butter, ½ lb. flour, the juice of a lemon, and a little grated rind of ditto. Beat the eggs and sugar as for sponge cakes, cream the butter, stir in the lemon juice and rind, add the flour and the beaten eggs and sugar, fill small well-buttered moulds, and bake in a moderate oven.

Sponge Cake with Apple Foam.

Cut a small sponge cake into slices, lay in glass dish, and pour over them enough sherry and cream to moisten them through. Put a few peeled and cored apples, with a gill of water, 1 oz. sugar, and the juice of a lemon, in a stewpan and boil down carefully to a thick pulp; rub it through a sieve, beat it to a froth, and having whipped the whites of 8 eggs to a *meringue* consistency, mix the two together, and put it in a rough uneven shape on the slices of sponge cake.

Tipsy Cake (Plain).

Get a Savoy cake (a stale one is the best), stick it all over with blanched almonds cut in strips, place it on a glass dish, which should be a round one, and pour over it one pint of sherry, with half a quartern of brandy, as the wine runs through put it back with a spoon until soaked through. Make a boiled custard in the following manner: Break 5 eggs into a basin with 2 ozs. of fine sugar; place 1 pint of milk on the fire and let it come to the boil, pour it on the eggs and whisk well together. Place it over the fire, keep stirring until thick, but on no account let it boil, or it will curdle and spoil. Pour it over the cake, sprinkle over with some nonpareils, flavour the custard with a few drops of essence of almonds or vanilla.

Savoy (Sponge) Moulds.

Eggs, 1¼ lb., 1 lb. flour, 14 ozs. castor sugar. Proceed as for sponge cakes, but bake in a much cooler oven. Fill the mould to within an inch of the top, then place a stiff band of greased paper round the outer surface and extending about three inches above the top; securely fasten with string to prevent the cake running over. To ascertain if it is baked, push a piece of thin wood into the centre of the cake and draw it out slowly; if the wood comes out clean, the cake is done, but not so if the cake adheres to it.

Swiss (Jam) Roll.

6 eggs, 6 ozs. sugar, 6 ozs. flour, or 1 oz. of sugar and flour to every egg. Whip the eggs and sugar as for sponge-cake batter, stir in flour, turn out upon a sheet of white paper about 15 inches square, spread evenly and of equal thickness over the whole surface of the paper. Bake in a hot oven for a few minutes only; as soon as it is set take it out, let it stand about a minute, turn it upside down upon a cloth, slightly moisten the paper, peel it off, and spread the roll with preserve (raspberry or greengage is usually preferred); then carefully roll it up, wash over with egg, and finally roll it in loaf sugar dust.

If jam sandwiches are required, put the mixture in circular tins, bake in a sharp oven; when baked, put two of these together with jam between, and cut into quarters.

Savoy (Sponge) Fingers.

Eggs 1 lb. 2 oz., 1 lb. sugar, 1 lb. flour, 4 drops essence of lemon. Finger biscuits are prepared and beaten as sponge cakes, but with extra care in the beating; when ready, they are pressed through the savoy bag upon paper. To accomplish this neatly, some practice is necessary; and as a guide to learners we will give a few directions which will elucidate the process. Put some of the mixture into a savoy bag, plug up the pipe with a cork, then twist up the mouth of the bag, and place it in a horizontal position between the thumb and forefinger of the right hand; then take the other end in the left, place the pipe upon the paper, remove the cork, slightly press the top of the bag with the right hand, and guide the pipe with the left; draw the bag towards you, and when the finger is about three inches long, cease to press the bag and simultaneously snatch it away. Run the whole mixture out as quickly as possible, then sift over some fine sugar, place upon a baking-tin, and bake in a sound oven. When baked, turn them upside-down, damp (not soak—it will run through and spoil them) the paper with warm water, and turn them over again; take them off the paper, and fasten the two halves together; if they do not stick well, use a little white of egg.

Maderia Cake.

I.—$\frac{3}{4}$ lb. butter, $\frac{3}{4}$ lb. of castor sugar, 1 lb. flour, 1 lb. of eggs, pinch of powder. Put the butter and sugar into a pan large enough to hold the mixture; stand it near the fire, or in hot water, to soften the butter but not to melt, or it will ont cream

properly; when softened, beat until it resembles thick whipped cream (this is called "creaming the butter"). When ready, add the eggs, one at a time, beating the mixture to a cream again after each egg; add 4 drops of essence of lemon, giving one or two turns, then stir in the flour; as soon as it is smooth and the flour is incorporated it will do. Do not beat it after the flour is in. These cakes are usually baked in small round hoops or tins papered, and placed upon a baking-sheet. When ready for the oven, sift over them some fine loaf-sugar dust, sprinkle gently with water, lay on each cake two thin slices of citron, and bake in a cool oven. Being very light, these cakes should not be shaken or taken out of the oven until done, or they will sink in the middle. During the baking they usually break open on the top, and when not sufficiently baked this opening will look moist.

II.—2½ lbs. flour, 2½ lbs. butter, 2 lbs. sugar, 2½ lbs. eggs, the grated peel of 2 lemons, ½ lb. citron peel cut small, a little grated nutmeg, pinch of powder, and a glass of brandy. Mix as before directed, and bake in small sizes.

III. (*Light*).—2¼ lbs. butter, 1¾ lb. sugar, 2 lbs. eggs, 2½ lbs flour, piece of volatile the size of a pea, 6 drops essence of lemon enough powdered cinnamon to cover a sixpence. Cream carefully; mix and bake in the usual way.

IV. (*Commercial*)—8 lbs. butter, 7 lb. sugar, 10 lbs. eggs, 12 lbs. flour, ¾ oz. cream, ¾ oz. carbonate soda, 8 drops essence lemon, about a pint of milk; use a little egg yellow in these.

School Cakes.

I. (*Seed*).—This is a good luncheon or tea cake: 2 lbs. butter, 2½ lbs. castor sugar, 1½ lb. eggs, 6½ lbs. flour, 2 ozs. powder No. 1, 2 ozs. caraway seeds, 3 pints milk, ¼ lb. peel (chopped fine). Cream the butter, sugar, and eggs as for pound cakes, then add the peel and seeds, giving it a turn or two: put in the flour and milk, stir rapidly and thoroughly, and as soon as the flour is incorporated, transfer to tins previously prepared, and as quickly as possible put into the oven, or the effervescence which has begun will quickly subside, and the cake will not be so light as it otherwise would be. This cake being very light and not over-rich does not keep long. It should be eaten quite fresh.

II. (*Currant*).—Mixture same as for seed, with the addition of 2 lbs. sultanas, 2 lbs. currants, ½ lb. peel. These ingredients should be added before the flour. Omit the seeds.

III. (*Balmoral Lunch*).—10 lbs. butter, 11¼ lbs. sugar, 11¼ lbs. eggs, 25 lbs. flour, 10 ozs. powder, 10 lbs. sultanas, 6 lbs. peel. 6 pints milk, few drops essence of spice and almonds.

Pound Cakes.

I.—1½ lb. eggs, 1 lb. sugar, 1 lb. butter, 1¼ lb. flour, 1 lb. sultanas, currants and peel mixed, piece of ammonia big as a pea. Put the butter and sugar into a pan large enough to hold the mixture, stand in hot water to soften the butter, so that it will beat up easily into a cream; it must not melt, or it will not cream properly. When soft, beat until it resembles thick whipped cream. Now add the eggs, one at a time, beating the mixture to a cream again after each egg; add the fruit and peel, giving the mixture a turn or two, stir in the flour, weigh off into sizes required, and bake in a sound oven. A small piece of sal volatile, about the size of a pea, powdered and beat up in the mixture, will greatly increase the lightness, and if eggs are scarce and economy desired, a bit of volatile, the size of a small filbert, will do in the place of three; but if the eggs be left out, 3 table-spoonfuls of milk must be put in, to compensate for the moisture of the eggs. Powdered cinnamon, enough to cover a sixpence, will greatly improve these cakes; dried cherries are a good addition.

II.—10 lbs. flour, 7 lbs. sugar, 5 lbs. eggs, 1 oz. volatile, 6lbs. butter, 4 lbs. sultanas, a few currants on top, allspice; powder the vol. and beat it with the butter, sugar, and eggs; cream and mix as usual. ½ pint of milk.

III. (*Small*).—1¼ lb. butter, 1¼ lb. sugar, 1 pint of eggs, ¼ oz. volatile, gill of milk, 3 lbs. flour; powder the volatile into the butter and cream as usual; this mixture is suitable for small cheap cakes, being very light and plain. A few currants should be sprinkled on top.

IV. (*Small*).—1 lb. butter, 1¼ lbs. sugar, 1 lb. eggs, 3 lbs. flour, 1 pint milk, 2 ozs. powder, ¼ lb. currants, and a piece of vol. size of a pea; beat the vol. with the butter and sugar, sift the powder with the flour, mix as usual; put a full table-spoonful into small round hoops placed upon a baking tin, and bake in a hot oven. The hoops should have paper collars in them.

Christmas or Fruit Cakes.

2 lbs. butter, 2 lbs. sugar, 2½ lbs. eggs, 3 lbs. flour, 4 lbs. currants, 4 lbs. sultanas, 1 lb. mixed candied peel (chopped fine), 1 nutmeg (grated), a pinch of mixed spice, milk about a gill, to make the mixture soft and pliable. Prepare the mixture the same as for pound cakes; place in large-sized cake-tins, and bake in a cool oven thoroughly. These cakes ought not to be eaten for some days, but should be put away in a cool, damp place to allow the atmosphere to act upon the juices and saccharine matter, and cause fermentation, which produces that fine flavour so much appreciated in bride cakes, etc. The cakes should not

be allowed to scorch, as this destroys their flavour, and impairs their digestibility.

Plain Christmas Cakes.

1 lb. butter, 1 lb. sugar, 1½ lb. eggs, 3½ lbs. flour, 1 lb. peel, 4 lbs. currants, pinch of spice, 2 ozs. powder, 1 pint milk; prepare as usual; bake in a steady oven.

Birthday Cake.

1 lb. butter, 1 lb. sugar, 1 lb. eggs, 1 lb. flour, 1 lb. sultanas, 1 lb. peel, 1 lb. currants, and a pinch of spice. Cream butter, etc., as directed; add fruit, etc., and bake in a cool oven. When cold, ice white, and write name and date, and "Many happy returns of the day," in pink icing-sugar on the top. Ornament sides either with sugar or frilled paper, etc. Dried cherries in place of currants for a better class cake.

Bride Cake.

I.—1½ lb. butter, 1½ lb. sugar, 1½ eggs, 2 lbs. flour, 1 lb. chopped almonds, ½ lb. dried cherries, 1½ lb. sultanas, 3 lbs. currants, ½ oz. spice, and gill of brandy. Cream butter, etc., the same as directed; add fruit and flour, mix well, and put into well-papered tins, and bake for four or six hours in a cool oven. Bake on double tins. If the oven has got a sound bottom put a few ashes between two tins and put the cakes upon the top tin.

II.—3 lbs. butter, 4½ lbs. sugar, 3 pints eggs, 4½ lbs. flour, 6 lbs. sultanas, 4 lbs. currants, 3 lbs. peel, 1 lb. chopped almonds, 1 oz. spice, 6 drops essence of almonds, ½ pint brandy; cream and mix as before. These cakes should be baked in a cool oven—place some ashes upon a tin, and then put the tin that has the cakes on upon the ashes.

Rice Cake.

½ lb. butter, ½ lb. sugar, ½ lb. eggs (4), ½ lb. prepared flour, ½ lb. ground rice, table-spoonful of milk. Cream butter and sugar usual way, and bake in cool oven.

Cocoa-nut Cake.

¾ lb. fresh butter, ¾ lb. sugar, 1 lb. flour, ½ lb. cocoa-nut (desiccated or grated), ¾ lb. eggs, and a gill of cream or good milk (if sour it will be better), 1 oz. of powder. Cream the butter, sugar, and eggs as usual for cakes; then add cocoa-nut, flour, and cream, and bake in a good sound oven; the prepared flour to be sifted with the flour previous to putting it in. When baked, ice with ordinary icing, or with *meringue* mixture, either of the two to be flavoured with an ounce or two of ground cocoa-nut; or this icing can be dispensed with.

German Kouglauffe.

10 ozs. fresh butter, 1 lb. flour, 2 eggs, ½ oz. powdered cinnamon, ½ oz. grated lemon-peel, 2 ozs. sugar, 1 oz. yeast, and 1 gill of cream. Warm the cream, stir into it the eggs, yeast, sugar, and a little of the flour. Put this away for half an hour to rise; then beat up the butter to a cream; mix with it the ferment and the whole of the ingredients; make them into a smooth batter, well butter a mould, put the mixture into it, and let it stand a quarter of an hour, and then bake in a moderate oven.

Dundee Cakes.

I.—1 lb. sugar, 1¼ lb. eggs, 1 lb. butter, 1¼ lbs. flour, ½ lb. peel, ½ lb. almonds, 1 lb. sultanas, 1 gill brandy. Cream the butter and sugar, add the eggs, mix the flour and the fruit as for pound cakes, putting the brandy in with the flour; when in the tins, put a few caraway comfits on the top, sift or dredge some castor sugar over them, sprinkle with water, and bake in not too hot an oven.

II. (*Seed*).—1¼ lb. butter, 1¼ lb. sugar, 2 lbs. flour, 12 eggs, 1 lb. orange peel cut fine, ¼ lb. blanched and chopped almonds, 2 ozs. caraway seeds; mix as before. When in the tins put some large caraway comfits on top.

III. (*Best*).—2 lbs. butter, 2 lbs. sugar, 2½ lbs. flour, 3 lbs. sultanas, 1 lb. peel, 1 oz. powder, 20 eggs, ½ gill rum, and a pinch of powdered cinnamon, prepare and mix as usual; when in the tins put caraway comfits on top; bake in moderate oven.

Almond Cakes.

I.—½ lb. ground sweet almonds, ½ lb. sugar, ½ lb. flour, ½ lb. butter, and 8 eggs. Cream butter and sugar as for other cakes; add the eggs slowly, beating briskly all the time, then stir in the flour and almonds together; mix carefully, and bake in sizes required in a sound oven. If a few of the almonds are beaten in with butter and sugar the eggs will go in better.

II.—1 lb. ground almonds, 1¼ lb. sugar, 12 eggs, 1 lb. fine flour, ½ lb. fresh butter, ¼ lb. fine chopped lemon peel; cream the butter, sugar and eggs as for other cakes; add the other ingredients, mix lightly; weigh in required sizes, and bake carefully in a moderate oven.

Almond Darioles.

¼ lb. butter, ¼ lb. sugar, ¼ lb. flour, 3 drops essence of almonds, 1 oz. finely chopped lemon peel, ½ pint cream, ½ pint milk, and 4 eggs. Cream butter and sugar, whisk eggs to a froth, mix all the ingredients well together, stir over the fire in a stew-pan for

ten minutes, but do not let it boil; then line some small moulds with puff-paste, three-parts fill them with the mixture, and bake in a sound oven. When the pastry appears to be baked the cakes will do; turn the moulds out and sift fine sugar over them.

Lemon Cakes.

¾ lb. butter, ¾ lb. sugar, 1 lb. eggs, ½ gill brandy, ½ lb. flour, the grated rind of two lemons; cream the butter, sugar, and eggs in the usual way, stir in the lemon-rind, brandy, and flour; put this into small moulds, and bake in a moderate oven.

Cinnamon Cake for Dessert.

Whites of 8 eggs, ½ lb. sugar, ½ lb. flour, ½ lb. butter; whip the whites into a stiff froth, slightly melt the butter so that it will pour out, but do not make it hot; mix ¼ oz. powdered cinnamon with the flour and the sugar, and then mix the whole together; pour the butter into the whites, add flour, etc., gently, and bake the required sizes in a steady oven.

Genoa Cake.

I.—20 eggs, 2 lbs. sugar, 2 lbs. butter, 4 lbs. flour, 2 lbs. currants, 3 lbs. sultanas, 1 lb. peel, ½ oz. cream of tartar, ½ oz. carbonate soda powdered and sifted with the flour, 1 pint milk. Cream the butter and sugar, and mix as usual, place in one or two square tins, with edges about 3 inches deep, chopped almonds thickly sprinkled on top. This cake must be baked in a cool oven, and if baked in one piece will take two hours or more. The tins must be papered with white stiff paper. It is usual in lieu of square Genoa tins to cut pieces of wood the required height, and fasten them on a flat baking-tin, prop them up with pieces of brick; these are called "upsets." Sultana and peel boxes make capital baking vessels.

II.—3 lbs. butter, 3 lbs. sugar, 4½ lbs. flour, 1 lb. currants, 5 lbs. sultanas, 30 eggs, 1 oz. powder, 6 drops essence of almonds, half a grated nutmeg, 1 lb. peel mixed; prepare as before, chopped almonds on top. A seed Genoa can be made with this mixture, by adding 2 ozs. caraway seeds, and leaving out the fruit *and the ounce of powder.*

III. (*Good*).—2 lbs. butter, 2 lbs. sugar, 3 lbs. flour, 4 lbs. sultanas, 1½ lbs. peel, ½ grated nutmeg, gill of rum, 1 quart of eggs, chopped almonds on top.

IV. (*Bulk Genoa, cheap and good,* 7d. lb).—20 lbs. butter, 20 lbs. sugar, 36 lbs. flour, 15 lbs. currants, 15 lbs. sultanas, 4 lbs. peel, 21 lbs. of eggs, about 3 quarts of stale milk, ½ lb. powder, 1 oz. mixed spice; prepare as usual, with or without almonds on top to suit price charged. Pine kernels are a good substitute for almonds

V. (8d. lb). — 8 lbs. butter, 8 lbs. sugar, 8 lbs. eggs, 14 lbs. flour, 1 oz. cream of tartar, 1 oz. carbonate of soda, 20 lbs. sultanas, 4 lbs. peel, pint milk, 6 drops essence of spice, 6 drops essence of almonds. Mix in usual way.

Rich Cherry Cake (10d. per pound.)

2 lbs. butter, 2 lbs. sugar, 2 lbs. eggs, 2½ lbs. flour, 1 lb. cherries, cut them in halves, ½ lb. citron peel, ⅛ oz. ammonia powdered and beaten in with butter and sugar, gill of milk.

Cocoa-nut Genoa Cakes.

7 lbs. flour, 4½ lbs. sugar, 4 lbs. butter, 2½ lbs. dessicated cocoa-nut, 2 ozs. powder, 3 pints eggs (½ pint of wine would be an improvement). Beat and mix in all the ingredients the same as for Genoa cake, and when in tins thickly cover the top with cocoa-nut; bake carefully in a cool oven. For variety, do not cover all the cake or cakes before going into the oven with cocoa-nut, but keep one plain, and when that comes out ice it with icing made by beating ½ lb. sugar with three whites; when beaten sufficiently to put on the cake, stir into the icing 3 ozs. cocoa-nut, cover the cake, and while wet, sprinkle some more cocoa-nut over it thickly to look like frost.

Devonshire Luncheon Cakes.

3 lbs. butter, 3 lbs. sugar, 2 lbs. currants, 2 lbs. sultanas, 30 eggs, 8 lbs. flour, ½ lb. chopped peel, 2 ozs. powder, 3 pints milk, pinch of spice, half a grated nutmeg; sift the powder with the flour, cream as usual; should be baked in a good sound oven.

Alexandra Cakes.

½ lb. butter, ¼ lb. lard, ¾ lb. currants, ¼ lb. lemon peel, 10 ozs. brown sugar, ¾ lb. flour, ½ oz. vol., 4 drops essence of spice, ¼ lb. ground almonds, 8 eggs, cream the butter and lard and vol. with the sugar and eggs as usual; add the other ingredients; bake in a square block, like Genoa cake.

German Cake.

2 lbs. butter, 2 lbs. sugar, 2 lbs. eggs, 7 lbs. flour, 5 lbs. currants, 1 lb. sultanas, ½ lb. peel, 3 pints sour milk, ½ oz. carbonate of soda; mix as usual, and when in tins put chopped almonds on top.

Sultana Cakes (8d. per pound.)

1¾ lbs. butter, 1¾ lbs. sugar, 3½ lbs. flour, 3 lbs. sultanas, 1 lb. chopped citron, 1 oz. powder, 1½ pints of milk, 20 eggs; cream as usual; when in tin put chopped citron on top.

Small Lunch Cakes (cheap).

1 lb. butter, 2 lbs. sugar, 9 lbs. flour, 1 lb. currants, ¼ lb. powder, sift with flour, 2 quarts stale milk; rub the butter and flour together on the board, then mix the sugar; make a bay, put in the currants and the milk, mix up quick and light; weigh into small tins as quickly as possible, and bake in a hot oven; dust the tops with white sugar.

Good Fruit Cake (for Xmas or other uses).

10 lbs. butter, 10 lbs. sugar, 12 lbs. eggs, 15 lbs. flour, 16 lbs. currants, 16 lbs. sultanas, ½ oz. spice, 4 lbs. mixed peel, 1 oz. powder, 1 pint milk.

Rout Cake.

Cream ½ lb. butter, ½ lb. sugar, and 12 yolks; add a grated lemon rind, 2 oz. ground almond, ¾ lb. flour; bake as Genoa, but without almonds on top.

The Emperor's Cake.

Soak in milk ½ lb. of crumbs from rolls of fine bread; squeeze it dry and beat up smooth with 4 ozs. soft butter and 3 ozs. sugar; when smooth add 6 eggs at twice, now add ½ lb. of mixed fruit (sultanas, currants, peel), 2 ozs. almonds; bake in buttered tins; when baked dredge with fine sugar.

Turkish Cake.

Boil ¾ lb. rice in 1½ pint milk, add 2 ozs. sugar, and 4 yolks of eggs, beat it all quite smooth, add few drops essence of orange or roses; turn out in an edged pan, wash over the yolk of egg, dust with fine sugar; let cool, cut into shapes, put upon a tin about an inch thick and bake in a sharp oven a few minutes.

Almond Sponge Cake.

1 lb. sugar, 9 eggs, ¾ lb. flour, few drops of essence almonds, 2 ozs. ground almonds, 1 oz. powder; whisk the eggs and sugar as for sponge cakes, put in essence, and lightly stir in flour; put in small battered moulds or tins; bake in sound oven.

American White Cake.

1 lb. butter, 2 lbs. sugar, 1 lb. whites of eggs, 1½ lb. flour, ½ oz. powder; cream the butter and sugar, well whisk the whites, then mix the flour with the baking powder, mix all together lightly, bake quickly. This cake can either be make in one large cake

and iced white when baked, or made into several round thin cakes the size of a small plate; when baked put a thick coat of icing, made with 4 whites, 8 ozs. sugar, beaten for a few minutes and made into a thick paste with desiccated cocoanut; when coated place them on top of each other, then make a thin vanilla icing of 2 whites, ¼ lb. sugar and 4 drops vanilla essence beaten together, add 1 table-spoonful of cold water, and pour over the cake. If the cake is not well covered, repeat this, and dry for a minute in the oven. Fondant Icing is best for this if you have it.

Princess Cake.

1¼ lb. butter, 1 lb. sugar, 1 pint egg whites, 1½ lb. flour, 12 drops of rose-flower water, and 1 glass of sherry; cream the butter and sugar, and thoroughly beat with them the pint of whites, adding a few at a time; having beaten these very light, put in sherry and rose water and stir the flour in lightly; put this into buttered and papered tins, and bake carefully. These cakes are usually iced and ornamented.

Savarin Cakes.

Set a sponge with ¼ lb sugar, 1 oz. yeast, ½ pint warm milk, and ½ lb. flour. Let this rise for two hours, then beat into it until quite smooth ¼ lb. fresh butter, 4 eggs, ½ oz. powdered salt, 2 oz. finely chopped peel and ½ lb. more flour. Let this prove or rise for 1 hour, then well butter one or two moulds, cover them inside with chopped almonds, tie a buttered paper round the outside, to prevent it coming over; put in the paste; let it rise; bake in a moderate oven. This cake usually forms the base for another dish, which has some liqueur poured over it after small holes have been pricked in it with a skewer.

Caledonia Cakes.

1 lb. sugar, 1¼ lb. butter, 1 lb. eggs, 1¼ lb. cornflour, 1 oz. powder; rub 6 pieces of loaf sugar on the rind of a lemon; also mince fine ¼ of a rind and 2 ozs. candied peel; crush the lumps of sugar with the lemon zest on them, mix it with the other; and cream butter, sugar, and eggs in the usual way. Mix in the flour and peel, and if at all firm, add a little milk, put a spoonful in patty-pans and bake in a good oven.

Oswego Cakes.

1 lb. butter, 1 lb. sugar, 1⅛ lb. eggs, 1 grated nutmeg, 1¼ lb. Oswego cornflour, vol. the size of a pea; beat up with the butter cream, and bake as usual in a moderate oven.

Cinnamon Cake.

Mix ½ lb. sugar, ½ lb. butter, ½ lb. flour, ¼ oz. powdered cinnamon with the whites of eight eggs beaten to a froth; add one glass of rum; mix all together and bake in a steady oven.

Dariole Dessert Cakes.

8 eggs, 2 ozs. sugar, ½ pint cream, 1 macaroon powdered, 8 ozs. cornflour, 2 ozs. butter, 4 drops of essence of vanilla; warm the cream; dissolve the butter in it; mix in all the other ingredients, and half fill well-buttered dariole mould with the batter, and bake in a steady oven.

Dessert Rice Cakes.

Cream as usual 1 lb. butter, 1 lb. sugar, 1½ lbs. eggs; add, when creamed, 1 lb. ground rice, ½ lb. cornflour, and 1 oz. of baking powder. Weigh into tins; bake in moderate oven.

Cupid's Cakes.

1 lb. ground rice, ¼ lb. fine flour, 1 lb. sugar, 12 eggs, the yolks of 6 more, 6 drops of essence of almonds, 1 gill of Jamaica rum; put all the eggs into a pan and stand in a little warm water, beat them with the sugar until they are light, then add the other ingredients; mix them together lightly; put into buttered cake-tins and bake in cool oven.

Zephyr Cake.

1 lb. sugar (icing), ½ lb. butter, whites of 12 eggs, table-spoonful of rose water, 10 ozs. fine flour, ½ oz. of powder; cream the butter and sugar, whisk the whites to a stiff snow; add the flour to the creamed butter, and the whites and flavouring at the same time; mix all lightly together; put in buttered and papered small moulds; bake in a cool oven.

Baba.

1 oz. yeast, ½ lb. Hungarian flour; mix with warm milk into a soft dough, and prove for two or three hours; rub 1 lb. fresh butter into 1 lb. flour, and 1 lb. eggs; work these into paste, and when the dough has well risen, mix them altogether. Mince and mix 2 ozs. candied citron peel, 2 ozs. sultanas, and ¼ lb. stoned raisins; butter a mould, half fill, let it rise, and then bake in a moderate oven.

Twelfth Cake.

2 lbs. butter, 2 lbs. sugar, 2½ lbs. eggs, 2½ lbs. flour, ½ lb. chopped almonds, ½ lb. peel, 3 lbs. sultanas, glass of brandy, 1 nutmeg, ½ oz. cinnamon; cream and bake in the usual way. These must be baked in well papered tins in a very cool oven.

To ice Twelfth Cakes.—Ice and ornament as follows: 1 lb. of icing-sugar, whites of 3 or 4 small eggs, enough tartaric acid to cover a threepenny-piece its own thickness. (This quantity will cover the tops of four good-sized cakes.) Put this in a clean dry basin, beat with a wooden spoon for about ten minutes, and it will then be ready for use. Place upon the top of the cake enough sugar to thinly cover it, and with a pallette-knife work it from side to side, always keeping one side of the knife flat upon the sugar; do not take it off or turn over, or scrape the cake. After the top is well and evenly covered, draw the knife off with one sweep, and draw it round the side to gather off the loose sugar that has run over. Usually the first attempt at icing leaves the surface a little rough; lift the cake and knock it gently upon the table, which will cause some of the ridges left by the knife to fill up; put a frill of white tissue-paper round the side, and one of pink, a little narrower, over it, so that the white shows a little above and below the pink. Ornament the top with twelfth-cake ornaments.

"Coffee-house Tough" (or "Batch") Tea-cakes.

are made by breaking 4 lbs. of bread dough into twelve pieces, rolled round, and with the rolling pin pinned out to about 3½ inches in diameter. Place them upon a baking-tin, prove as light as possible in the steam cupboard or trough with hot bread or boiling water, and bake quickly (like muffins, not too much) in a good sound oven. They are usually toasted.

Griddle Breakfast-cakes.

Whip 8 eggs, mix into three quarts of milk, add 1 oz. of salæratus, ½ oz. salt; make them into a stiff batter with fine flour or cornflour, and bake in a quick oven, in small buttered tins.

Cadogan Cakes.

Cut a Madeira or a Savoy cake that has been baked in a plain mould into slices, spread them with apricot jam, place them upon the top of each other in their former shape, ice this with icing in the usual way, but flavoured with lemon, and made with the

whole eggs, so that the yolk will give a slightly yellow tinge. Before the icing sets, cut out a number of small leaves, or diamond-shaped pieces of angelica and dried fruit, and place them evenly in rotation round the outer edge.

Small Dessert-cakes.

½ lb. sugar, ½ lb. butter, 5 eggs, 10 ozs. flour, small glass of wine, and ½ lb. dried cherries. Beat the eggs, butter, and sugar as usual, add flour and wine; mix lightly all together, butter some very small moulds, and two-thirds fill them; stand them in a large cake or bread tin, bake in a cool oven; when they are done, they can be served either ornamepted or plain.

Almond Rout Cakes.

1 lb. ground sweet almonds, 1 lb. sugar, made into a stiff clear paste with yolks of eggs. When the paste is quite smooth, make it into small fancy shapes, such as garters, knots, rings, crowns, Prince of Wales' feathers, etc. If you have the blocks, and the mixture is inclined to stick, dust the blocks and board with finely powdered sugar mixed equal parts with maize starch. Melt a little gum arabic and sugar, wash some over with it and dip into nonpariels: ornament with neatly cut small pieces of angelica and lemon peel; pipe with pink and white icing, etc.; lay wafer-paper upon a baking-tin, put the biscuits upon it, but do not let them touch each other; stand them on one side for an hour or two in a warm place—a day will not hurt them; when well hardened, bake in a brisk oven very carefully.

Almond Paste, or Rout Cakes.

2 lbs. ground sweet almonds, mix with 1 lb. sugar, 2 table-spoonfuls of water; place them in a stewpan on the hot plate, and stir continually until the mixture is quite hot, and runs off the spoon; pour into a pan, allow to cool a little, then add 1 lb. sugar, 1 oz. gumdragon, dissolved in a little water and strained, and the juice of 2 lemons Beat this mixture for ten minutes, then turn it out upon a slab dusted with fine sugar; divide into three parts, and colour each according to taste with cochineal for red, saffron for yellow, spinach for green, etc.; make into shapes upon wafer paper, dry, and bake.

Gâteau.

10 eggs, ½ lb. sugar, 1 oz. of very finely-chopped lemon peel, ¾ lb Vienna flour, and ½ gill rose water; whip the eggs into a

strong froth, and then carefully stir in the other ingredients; put it into a well-buttered tin or mould, and bake in a cool oven. This is usually glazed with chocolate or other fondant.

Neapolitan Cake.

½ lb. ground sweet almonds, ½ lb. sugar, ¼ lb. butter, 10 ozs. flour, 2 ozs. finely-chopped lemon peel, yolks of 6 eggs, and a table-spoonful of orange-flower water. Cream the butter, sugar, and eggs; add the other ingredients, thoroughly mix, and leave it in a cool place for an hour to harden; then roll the paste out ¼ in. thick, stamp it into rounds; bake them carefully, then place apricot jam between two rounds, and ornament to taste with pink and white icing, or sifted sugar (pink).

School Cake.

This mixture will also do for tea-festivals and school-treats; is usually retailed at 6d. per lb., and will generally give satisfaction. Sugar, 3½ lbs., 3 lbs. butter, 1 lb. chopped peel (if peel is chopped fine it is much more economical, as it will go farther and flavour many more mouthfuls), 12 or 14 lbs. sultanas, 10 lbs. flour, ¼ lb. powder, 20 eggs, 3½ pints milk (sour milk will do very well), and ¼ oz. good spice. The same mixture for seed cakes. Omit fruit and add 2 ozs. seeds. Cream butter, sugar, and eggs as usual. Add spice, fruit, peel; give a turn or two just to cover the fruit from the flour, and then add the flour and the milk, and quickly mix the whole. If the quantity of milk does not make it quite moist enough use ½ pint more. Put the mixture into tins, but not too thick. Flat cakes, about two inches thick when they are put into the oven, are best. Be sure and bake well, but do not burn.

Queen (or Heart Cakes).

½ lb. butter, ½ lb. sugar, ½ lb. eggs, 1 lb. flour, ½ lb. currants, piece of volatile size of a small bean, and ½ gill milk. Cream the butter, sugar, and eggs in the usual way; powder the volatile and beat it up with the butter, etc., then add the flour and currants, and mix lightly. When filling heart cake tins (which should be well buttered), spread the mixture from the middle towards the sides, leaving the middle slightly hollowed, so that as the mixture begins to melt, it will run back into the hollow, and this will consequently be longer baking; and the sides being already set, the middle will be forced up, and break open into what bakers call a cauliflower head.

Digestive Cake, etc.

3½ lbs. eggs, 3 lbs. sugar, 2½ lbs. flour, ½ lb. butter, 3 drops essence of lemon, and enough powdered cinnamon to cover a

threepenny piece its own thickness. Whip the eggs and sugar into a light batter, the same as for sponge cakes, and just before giving the last few strokes, add the lemon essence and cinnamon. Partially melt the butter and whip it into a light froth. Add the flour to the batter, and commence stirring it in; when about half mixed, add the creamed butter gradually, at the same time continuing the mixing-in of the flour. Great care must be taken at this stage, as over-mixing will cause heaviness; as soon as the flour appears to be incorporated, turn it gently out into a tin with deep edges, the same as for Genoa cake, and bake in a cool oven. This cake, when cut, resembles sponge cake, is of a rich yellow hue and light texture; it can be served plain, or cut into shapes, with apricot preserve, and ornamented, etc.

Tea-cakes or Sally Luns.

1 pint milk, 1 pint water, 6 ozs. sugar, ¾ lb. butter, 2 ozs. yeast, 3 eggs, and 5 lbs. flour; ferment the same as for buns, and when the dough is ready, weigh into pieces of ½ lb. or less, mould them round, put them upon tins, with or without hoops around them, prove, and bake.

Balmoral Cake.

I. (*Seed*).—This is a good luncheon or tea cake: 2 lbs. butter, 2½ lbs. castor sugar, 2½ lbs. eggs, 6½ lbs. flour (prepared), 2 ozs. caraway seeds, 3 pints milk, ¼ lb. peel, chopped fine. Cream butter, sugar, and eggs as for pound cakes, then add peel and seeds, giving it a turn or two; put in the flour and milk, stir rapidly and thoroughly, and as soon as the flour is incorporated, transfer to tins previously prepared, and as quickly as possible put into the oven, or the effervescence which has begun will quickly subside, and the cake will not be so light as it otherwise would be. This cake, being very light and not over rich, does not keep long. It should be eaten quite fresh. Fourteen ounces for "6*d*."

II. (*Currant*).—Mixture same as for seed, with the addition of 2 lbs. sultanas, 1 lb. currants, ½ lb. peel; these ingredients should be added before the flour. Omit the seeds; add a few drops of the essence of spice.

Dough Cakes

are easily made, and are very suitable for bulk orders and cheap school treats. The following quantities will make a good cake to be multiplied to the quantity required:—To every 4 lbs.

ordinary bread dough, rub in ½ lb. butter, ¾ lb. sugar, 2 eggs, a little spice, gill of hot water, 3 lbs. fruit, currants or sultanas, or mixed. Do not put the fruit in, until the dough and other ingredients have been thoroughly rubbed together *quite smooth*. The fault with these cakes is, that they do not usually get sufficient mixing, and patches of dough spoil both taste and appearance; to obviate this, place the dough upon the board with the butter, eggs, sugar, spice, and hot water, and then with both hands tear the dough to pieces, rubbing at the same time until smooth; then add the fruit and lightly mix it in; do not rub it when the fruit is in or it will be smashed, and make the cake look very unsightly. When mixed, put into tins, and prove well before baking; bake in a cool oven.

Sanitas Cake.

2 lbs. flour, ½ lb. butter, ½ lb. sugar, 2 eggs, 1 oz. powder, pinch of spice, ⅝ pint milk, and 1½ oz. of liquorice powder; make up as other cakes, weigh into small sizes, bake in a quick oven. They are suitable for children, being a mild aperient.

Tottenham Cake.

4½ lbs. flour, ¼ lb. powder. ¾ lb. margarine, ¾ lb. currants, 1¼ lb. sugar, rub all well together; wet up with water; spread 1 inch thick on a flat tin, with piece of wood across each end, and bake in quick oven. When baked, ice over thinly with water icing or fondant, which is cheaper and better, excepting the labour. Usually there is some soiled left, which will do for the common work.

Trocadero Cakes.

1½ lb. butter, 1½ lb. sugar, 2 lbs. eggs, 2 lbs. flour, 1 lb. sultanas, ½ lb. citron peel, ½ lb. half dried cherries, ½ oz. ground ginger, mix and bake carefully as for pound cakes. When cold, mask with the palest green fondant, pipe the outer part of top with white icing; group tastefully bright drained or glace preserved fruit in the centre, and cover the side with finely chopped pistachio kernels.

Seedless Caraway Cakes.

Take 1 lb. flour, 1 teaspoonful of Bush's Seedless Caraway Crystals, ½ lb. butter, 10 ozs. of castor sugar, 2½ lb. eggs, ½ gill of milk, and 1 teaspoonful of baking powder. Butter the cake tin thoroughly first of all, then line it with buttered paper. The buttered side to be next to the cake mixture. Cream the sugar and

butter together in a basin, that is to say, work the two ingredients into each other with the hand or wooden spoon, until the mixture is smooth and creamy. Then beat one egg in. The flour, caraway powder, and baking powder should be passed through a wire sieve together. Add half of this mixed flour to the mixture in the basin and stir it well in, then add the other egg, beating it in the same manner as before, and lastly, the remainder of the flour. Turn this into the prepared cake tin and bake in a moderate oven about an hour and a-quarter. Some people like to see some raisins or sultanas, in which case a few can be added during the mixing. Of course, the proportion of sugar, eggs, and butter may be varied according to taste.

Aberdeen Cake.

3 lbs. flour, 2 lbs. butter, 2 lbs. sugar, 1 lb. chopped citron, 1 lb. cut dried cherries, good pinch of nutmeg, and 22 eggs; cream the butter and sugar in the usual way; add and beat in the eggs, two at a time, mix in the flour, and then the fruit. Weigh two pounds into oval or special diamond shaped frames; when baked, draw the tins off without breaking the collar, which should be of good stiff white paper, and pour enough fondant upon the top to cover it, some pink, some white; place glacé fruits in middle of top, and four opposite diamonds of angelica.

Simnel Cake.

Mixture: 1 lb. butter, 12 ozs. sugar, 10 eggs, 8 ozs. ground almonds, 1 lb. sultanas, 4 ozs. finely chopped citron, a good pinch each of ground cinnamon and mixed spice, the juice of 3 lemons and 2 lb. flour. Cream the butter and sugar in the usual way, add and beat in the eggs, then add the spice, fruit, almonds, and lastly, lemon juice and flour. Weigh into size required and bake in a cool oven. When baked, cover with a thin layer of almond paste, made by mixing castor sugar and ground almonds into a smooth stiff paste with eggs; dust the almond top lightly with castor sugar, and place round the outer edge a border of small crystallized fruit, laying in the interstices of the inside of the border silver dragees; it will be necessary to fasten the crystallized fruit on with icing sugar. Generally these cakes should be baked in well papered hoops, with a stiff white paper collar, standing well up, and be sent out with the collar on, or in its place a frill or silvered paper. The Simnel is an old-fashioned cake, consequently currants are freely used in it; but currants do not suit the taste of good class buyers, and therefore sultanas are substituted, a fruit always in favour.

Rope in Cakes.

Seed cakes are those most frequently attacked by ropiness. The primary cause is a species of ferment that is set up within the cake, and this ferment is brought about by the presence of too much moisture, and also by a very cold tough mixing, which makes it slimy and tough. The caraway seeds are the contributory factor; they have a peculiar mucilaginous nature which lends itself to support any such ferment, especially when in the presence of such congenial allies as eggs and milk—and these in only a partially cooked condition. Ropiness will seldom occur in cakes that are properly made and properly baked; and if you trace any tendency in that direction, keep your mixture drier and bake it more; also, if it is seed, and absolutely necessary to keep them some time, lessen the number of seeds to the lowest possible quantity.

* * *

The Discoloration of Iced Cakes.

The ripening of cakes, like the ripening of fruits after picking, is a process of natural decomposition. The moisture inside the cake, and the "life in the air" outside, act upon the saccharine matters and set up a species of ferment, which degrade the other constituents; and as the decomposition becomes general and active, it attacks any porous or soluble matter with which it is in contact. Up to a certain stage, this ripening is good, and in fruity cakes necessary. To arrest this ripening, blending, or decomposition, is to mar the flavour and perfection of the cake. As in "pickling" eggs and preserving provisions, the arresting by chemical means of the natural law usually result in loss, or partial loss of flavour and bouquet. When it is necessary to store iced cakes, the cakes should be iced as soon as it is thoroughly cold, before the air—or what is commonly called air—interferes with it, and sets up this decay. In the case of bride cakes, if the almond icing were brought down over the side of the cake, that would lengthen the time before the juice would attack the icing sugar. To prevent this entirely, some insoluble matter that is less subject to natural decay must be interposed between cake and sugar. It is a great preservative to the outer icing sugar to wash or varnish the cake with a solution of gum or gelatine, with lemon juice or proof spirit; brush it over the cake, and let it dry; when iced, keep in a dry place.

Cake Ornamentation.—Icing and Piping.

To learners in icing and piping, I would recommend the following plan; it will make very good practice, and is at the same

time cheap and convenient: Get some firm lard and work it up lightly with a little flour, and then with the ordinary icing pipes or paper tubes, ornament a cake tin, turned bottom upwards; it can be scraped off and used again and again. It is not always possible to get practice with real cakes and sugar, and practice you must have; for if ever the old adage was true, that "Practice makes perfect," it is so in this case. Icing pipes are sold by most confectioners' toolmakers from sixpence each, bags and nozzles ninepence to a shilling, though paper in the hands of our artists in sugar can be made to accomplish great things; but to make the larger stars, etc., pipes are indispensable. To make paper tubes or pipes, use good paper—a special paper is sold for the purpose and is very good; cut through a small square from corner to corner to form a triangle shape; fold this up in the form of a cone like the small sugar paper "cups" the grocer puts the sugar in; fold it to a fine point, and cut the point off according to the size of the tube you wish to use; put the tube and icing in; fold down the mouth when the icing is put in, to prevent it squeezing out when the paper is pressed. Use the thumb on the top to press the sugar out, and not the guiding fingers at the bottom. Keep the fingers clean, but do not lick them with tongue.

To Ice Cakes.

1 lb. of icing sugar, whites of 3 eggs (during the time when eggs are dear icing powder is a cheap and good substitute for whites of eggs, or if in such a fix that neither of them can be obtained, slowly dissolve ½ oz. of gelatine or isinglass in a gill of water, and when quite dissolved, add a pinch of tartartic acid or 4 drops of acetic acid, and beat in the sugar in the usual way until stiff enough); put in a clean dry basin, and beat until it stands in any given shape (about ten minutes will do this); it will then be ready for use. If required coloured, the colouring must be beaten into it. Put upon the top of the cake as much sugar as will cover it all over (Fig. 1), or only the top as desired, and with a palette knife large enough to cover the diameter of the top, work it from side to side (Fig. 2), always keeping one side of the knife upon the sugar. Do not take it off or turn over, or scrape the cake. After the top is well and evenly covered, draw the knife off with one sweep. Usually the first attempt at icing leaves the surface a little rough; lift the cake and knock it gently upon the table, which will cause some of the ridges left by the knife to fill up; and if the sides are to be sugared also, let the sugar run over, and put the knife round once roughly to cover the cake, and then give one even sweep right round the

cake (Fig. 3). Do not take the knife off until the whole circle is made, or it will show the mark. The knife should not be flat upon the side of cake, but slanting, so that it will carry the

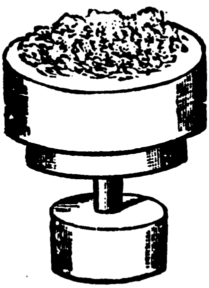


FIG. 1.

FIG. 2.

excess sugar before it right off at the finish of the stroke; put a frill of white tissue-paper round the side, and one of pink, a little narrower, over it, so that the white shows a little above and below the pink. Ornament the top with twelfth-cake ornaments, or the ornaments desired according to the use to which the cake is to be put. Wedding cakes should be all white; birthday, christening, or other table cakes, should be coloured. Don't make the colours too glaring and deep, that is coarse and vulgar; but delicately tinted. Use pipes thus (Fig. 4), or use the thread pipe as you would a writing pencil. A modern and much nicer form of ornamentation is to glaze with fondant sugar, and then decorate with glacè fruits, angelica, etc. Royal icing to eat is an abomination.

When *icing* cakes use a cake-turntable having a small base with swivel, upon which a large circular table, about nine inches in diameter, is fastened. The cake is placed upon this, and is turned round as the operator wishes. If not come-at-able, use a round cake-tin turned bottom upwards: it should be slightly smaller than the cake to be iced, to allow the knife to go round the side.

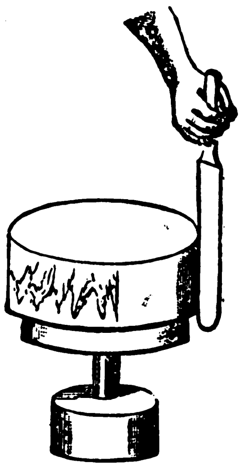


FIG. 3.

FIG. 4.

NOTE.—In Cut 3 the knife, by a mistake of the engraver, is placed backwards in the hand; the thumb should be nearest the blade; and in Fig. 4 the thumb should be upon the top of the bag.

Colouring for Cakes.

For red or pink, carmine or cochineal.—To prepare cochineal, boil for five minutes ½ oz. cochineal powdered, with ½ pint cold water, ¼ oz. alum, 1 oz. sugar; take off fire, throw in ¼ oz. cream of tartar; stir well; when cold, bottle, and cork for future use. For green, either pound spinach leaves, press out juice, and boil a minute before bottling to preserve it; or put them in a little water (to keep from burning), and boil until soft, rub them through a fine sieve, and bottle for use. For brown, boil 2 ozs. sugar just moistened with water, keep stirring; and as soon as it begins to colour, draw on one side, and let it slowly brown and dry (about an hour), when nearly black (but do not burn) put in a bottle, and cork. When required, moisten with hot water, if dry. Chocolate, melted, will also make a nice brown. Colourings,

flavourings, or essences can be obtained in paste and powder cheaply, and in great variety, and are much brighter and better for the purpose.

Almond Icing for Bride Cakes.

½ lb. ground sweet almonds, 1 lb. sugar; mix them, and make them hot in the oven; then mix them into firm paste with eggs, and put upon top of cake quite smooth; let it dry for a few hours before putting on sugar icing. If made firm, it will be dry enough to put the white icing on as soon as done; roll it with a rolling-pin the size of the top of the cake; lay on and level with rolling-pin; also lay the rolling-pin perpendicular against the side, roll it round the cake; this will square up the rough edges.

Pink dry sugar for ornamenting is made by dropping a few drops of carmine upon sifted loaf sugar dust or large crystals, and rubbing it between the hands until the colour is evenly distributed, and deep as desired; then dry it. Use the sugar either coarse or fine, to suit work.

PASTE AND PASTRY.

There are several modern recipes for paste and pastry. The baker has vied with the cook to produce something novel, and many modern recipes are here given. There is the old puff paste, for which I will give the three or four standard recipes. There is also the plain short paste with and without sugar, which is used for lining patty-pans, or tart dishes, where it is necessary that the paste should retain its shape and not puff up, so that the filling that is placed in them may not be displaced in the oven; and, therefore, throughout the recipes for cheese cakes, custards, etc., requiring a passive crust, I will merely say short paste, leaving it to the taste of the workers to make any variations they think fit, not forgetting that puff paste, after it has been rolled and cut out twice or thrice, ceases to puff and has become short, and is therefore a very useful short crust for ordinary purposes where the demands of the trade are small; the cuttings rolled up and pinned out (allowing a minute or two for the paste to recover its pliability) will do very well. *About the various fillings*, cheese cakes, etc., it will be needful also to say a few words to save a great deal of re-writing in different quantities of the same mixture. The new fillings are really, in the majority of cases, simply good cake mixtures called by all sorts of fanciful names, the recipes for which would take up more space than we can afford. Nor is it necessary that they should be given;

most persons with average intelligence will be able to grasp the principle of their make up when I say that a good Madeira mixture, light and rich, or even weights of butter, sugar, eggs, and flour, with a pinch of baking powder mixed as for pound cakes, is the filling of these goods. These cake mixtures form good bases upon which to build a number of nice things, by adding flavourings, ground almonds, etc. *In the directions for puff paste* I have only spoken of the use of butters for the purpose, but that is not from any prejudice against the use of margarine and other mixtures; on the contrary, given that the mixture is of first quality, and made specially for puff paste making, I would always prefer to use it in place of the sloppy, salt stuff or the foreign rank stuff that is sold as pure butter.

Puff Paste.

Use equal quantities of butter and flour, and mix as here directed; take an eighth part of the butter and rub it into the whole of the flour, using enough cold water, with a pinch of cream of tartar in it, to make this into a soft dough; press this dough out, dust with flour, and fold it up several times, until it is tough and springy; let it stand for two or three minutes to become pliable, and then with the rolling-pin roll it out to about a quarter of an inch thick, keeping the sides and ends as square and straight as possible; then roll the remainder of the butter into a square flat piece, not quite so large as the paste (about two-thirds), lightly dust it with flour, and lay it upon the dough; fold the uncovered part of the dough over the butter, so as to completely envelope it. Now dust the board with flour, lay the paste upon it, lay the rolling-pin upon the paste, and lightly roll it backwards, forwards, and crossways, until the paste is about a quarter of an inch thick, or thin enough to fold up easily without breaking the outer skin of the dough; press the rolling-pin evenly upon the paste, and do not jerk, drag, pull the paste, or allow the butter to break through and stick to the board or pin. When rolled enough, bring the two opposite ends over to meet each other upon the top and in the middle of the paste; lightly dust and roll out and fold again in the same manner; dust with flour, cover with a cloth, and put away in a cold place for an hour to allow the butter to become firm and the dough pliable. Then flour the board, roll out and fold again; this will make the third folding. Repeat these foldings and rollings three times more, making six in all. The paste is now ready for use, viz., for cutting into tartlets, *vol-au-vents*, French pastry, etc., and all pastry that is required to be very light and flakey. Cut with a sharp cutter, and do not touch the edge when picking up or

washing over. After the paste has received the sixth roll out, it will, upon every further rolling, become less flakey and be more suitable for fruit-tarts, etc.

The foregoing directions for pastry-making will meet all ordinary needs; but there are certain points, such as the use of soft butter and the extreme fluctuations of temperature, that have so much to do with the making of good puff paste, that a few explanatory remarks are absolutely necessary to guard the learner against those frequent failures and disappointments which inevitably follow upon carelessness or want of knowledge. For instance, sometimes the summer is intensely hot, often reaching 105°, and all ordinary instructions would, in such circumstances, be insufficient to enable people to turn out goods in a workmanlike manner. Butter is reduced to a state bordering upon oil, and everything depends upon the care with which the butter is prepared beforehand, the gentle handling, lightness of touch, and the rapidity with which the paste is worked off. This extreme heat being followed by a sharp bout of severe frost, all the previous conditions are naturally reversed, the hard frozen butter has to be well worked down, and the paste to receive more rolling. We give a few precepts about the preparation of butter, the use of ice, and the cause of 'tough,' 'short,' or 'flinty' pastry:—

In Hot Weather

choose a good quality butter, without moisture or loose salt, or a good mixture of fats; have it cut into a square piece direct from the tub, or package, and do not handle or pat it. Put it into the refrigerator; failing a refrigerator, place it upon ice or iced water. When the butter is set firm, dust with flour; put upon a board and flatten it out to the size required to be covered by paste; put it away again upon a board until it is firm and ready for use. When the butter is firm, wet up the flour with iced water with a pinch of cream of tartar in it, and mix as directed; be careful to keep the paste from sticking, and do not cover with loose flour. If there are signs of the butter coming through, only fold and roll one fold at a time, and put the paste away near ice for a few minutes each time, until the six foldings are completed. When the butter is soft and weak, ice should always be used; but if firm, and weather cold, it will not be necessary.

The cause of tough flinty pastry is insufficient rolling: the butter, if firm and hard, will, unless well rolled in, remain in layers, and when the paste is put into the oven, these layers will lift the paste and cause it to be flakey; but the butter, not having been thoroughly incorporated with the flour, will be liberated by the heat of the oven—in other words, boil out.

This will cause the paste to be flinty, and although flakey while hot, it will, when cold and exposed to the air, become tough. In hot weather the converse is the case. The butter is soft and easily amalgamates with the flour, and the resulting pastry is short and rich. When the butter is in this condition, great care will make the best of it; but if used in its soft state it is impossible to make satisfactory light goods from it. More or less rolling is of little consequence, the great point to be observed is the preparation of the butter some time before using—the day before, if possible.

You may not always be able to obtain ice in summer; if not, use cold spring water, or as cold as you can get it, and put an ounce of powerful saltpetre in it, and stand the butter in that over night. In very cold weather the butter will be ordinarily very hard, and if put upon the paste in that state will break through; to make it workable put it upon the pasteboard, and work it down slightly, but do not make it too soft. If the butter is salt as well as firm, work it down in a pail of water and well wash it. After handling, make into the size required, and put away for an hour or so to recover its tenacity. If you are making a large piece of paste, when finished rolling lay it by, cover with a cloth, and cut from it as required. Some makers prefer not giving the last fold to the whole piece, but cut a piece from the bulk, roll it out, and fold each piece. There is this advantage: you can thus make your pieces flakey, or partly so, or solid, as you may need, for the kind of tarts, tartlets, patties, etc. Tartlets, to prevent waste, should be cut out in two pieces, roll the paste half the usual thickness, cut out two pieces, stamp the middle out of one of them with a smaller cutter, and lay it upon the top of the other, having washed over the under one to make them stick together. When you wash pastry, be careful not to wash the edge, as it spoils the appearance, besides preventing the proper rising. In pastry, when the middle has to come out, cut or mark the piece to be taken out with a cutter, dock the piece with a skewer, knife, or fork, and when baked remove it by first running a penknife round it, then lift it up. Use as hot an oven in the baking as possible, without burning or undue coloration.

In the baking of pastry, the heat of the oven should be regulated according to the article intended to be baked. Light paste requires a moderately quick oven. If the oven be too hot, the articles will be coloured, or appear to be done, before they are baked enough, and if then taken out of the oven, instead of retaining their puffed-up appearance, they immediately fall and become flat. On the contrary, a cool oven will prevent them rising to the proper extent, and having a nice colour.

Tarts or puffs that are iced (or washed over with egg, and powdered sugar dredged over them, and then sprinkled with water), require a cooler oven than those that are not iced, for the oven if too hot will scorch or catch the icing, and discolour the goods. Leaving the oven door open will sometimes remedy this evil; but the goods should not be too near the mouth of the oven in this case. Pastry, when soaked or baked sufficiently, can be handled or slid about the baking-tins, or lifted from the patty pans without breaking, if properly and sufficiently baked. Good pastry requires to be placed on clean tins, or in patty-pans, without using butter or grease of any kind.

To Ice Tarts and Pastry, etc.

Make a wash with two whites of eggs to ½ pint of water. Put the whites into the water, and then whisk it; if the whites are whisked before going into the water, they will not mix freely, but will settle as a froth upon the top of the water. Dip a paste-brush into this liquid, and lightly wash over the pastry; then thickly dredge over it some castor-sugar, and sprinkle with the wash. Do not put on too much wash, or it may run off and disfigure the goods. If the dredging, etc., is carefully managed, a thick coating of frosted or glazed sugar will be produced. If the sugar is put on thin, the heat of the oven will quickly melt and brown it, giving it the semblance of a varnish. Therefore, according to the desired appearance of the goods should be apportioned the quantity of added sugar.

The question whether to ice pastry before or after putting into the oven is dependent upon the size and weight of the article to be baked and the heat of the oven it is baked in. If the pastry is small, and the oven not too hot, then, as in the case of Coventrys and articles of that size, they can be iced before transference to the oven. But care is always necessary in baking pastry that has been iced previousiy, because the sugar browns and burns very easily. If the oven be cool, fruit pies may likewise be sugared before going in; but with a hot oven, large pastry or pies should be partially baked before icing. In the latter case, if the articles be taken out before the pastry is set, there will be danger of its collapsing and becoming heavy. Allow the paste to become set before moving.

A very nice icing is made by whipping whites of eggs to a froth, and with a brush laying it over the paste, which is then to be covered thickly with sugar and sprinkled with water.

To make a Vol-au-vent.

As soon as the puff has received the last turn, roll it out to about half an inch in thickness, and then with the *vol-au-vent*

cutter cut out a single piece. Roll out the remainder much thinner, and with the same cutter stamp out a piece to form a bottom; then with a cutter about half the size of the first one stamp the middle out of the thickest piece cut out first, slightly damp the thin bottom piece, and put the large oval ring upon it, carefully fitting it all round. When it is properly attached, place upon a baking-tin and bake in a good sound oven. The piece that was cut out from the top should be rolled a little flatter or thinner, washed over, and some folded leaves or other paste ornaments put upon the top, and baked. This will do for a cover for the *vol-au-vent*.

(2) Puff Paste.

1½ lb. flour, 1 lb. butter, ⅛ oz. cream of tartar, ¼ oz carbonate of soda. Put the cream, soda, and about 2 ozs. of butter, rub them well together, and make a bay; add enough water to make a light springy paste, make it as tough as possible; let it lie five minutes to recover, and then add the butter, and work off as before directed.

French Puff Paste

is made by adding 3 or 4 yolks of eggs to 1 lb. butter, 1 lb. flour. The yolks are added with the water and made into a light dough, and rolled out as usual.

Short Paste.

Rub ½ lb. or ¾ lb. butter into 1 lb. flour; wet into a pliable paste with water, and work down quite smooth.

Sweet Short Paste.

This paste is used for fruit and other sweet goods. 1 lb. flour, 2 eggs, ¾ lb. butter, 2 ozs. sugar, mixed into paste with water, and rubbed down as before.

Short Paste for Raised Pie-cases.

If the case is merely to hold the mixture, and not to be eaten, make it very plain, because the plainer the paste the better it will stand up. In such case, dissolve ¼ lb. of lard in ½ pint of boiling water, and stir in with a wooden spoon as much flour as will make it into a hard paste (about 1 lb. 2 ozs. of flour). Thoroughly knead it so that it resembles a smooth, hard biscuit dough; then mould it into the shape of a sugar-loaf or cone, and put the palm of the left hand at the side of the bottom of this cone, and with the right hand press the top downwards;

keep working the knuckles of the right hand downwards, and at the same time work up the sides all round with the left hand. Continue this until the box, so to speak, is deep enough, pressing the right hand about inside, and sustaining the sides with the left, and working it upwards at the same time. When the case is raised enough, put it away to harden; after which wash the sides with yolk of egg. Ornament with leaves and other designs cut from the same paste, fasten on securely with egg, and put away to harden. Cut the lid out, wash and ornament, etc. If the worker does not make a nice shape by the foregoing plan, then roll the paste out with a rolling-pin, cut out the bottom to the size required, also a band high enough and long enough to go all round the bottom; wash the bottom with egg to make it stick, and stand the band on it; bevel off the two ends, and join them securely and neatly. Be sure and fasten to the bottom securely, or the gravy will run out; wash with egg, and ornament as before. If the paste is for eating, use ½ lb. of butter to 1 lb. of flour.

Beef Patties.

Cut up lean beef quite fine, take out all the skin and sinew, chop a little fat with it, mince a very small onion, and a little parsley, pepper and salt sparingly, mix a table-spoonful of suitable sauce, with enough water to make gravy, and put the meat into it before putting it into patty pans; make puff paste, cut out the tops first, and then use the cuttings or some short paste to line the bottom of the patty-pan; put the meat in quite moist from the sauce, put the tops on, fasten them down all round by gently pressing the outer edge; wash over with yolk of egg thinned down with water to avoid its colouring too much; cut out some paste leaves from the cuttings, stick them on top, and thoroughly bake in a sound oven; garnish with parsley.

Chicken Pie for Picnics.

Cut two large chickens into neat joints, put all the trimmings and bones, etc., into a stewpan, a little pepper and salt, an onion, piece of mace, and a few herbs; cover with water or "stock," let this simmer two hours to make gravy; make a forcemeat of the liver, a slice or two of tongue, ¼ lb. ham, and the yolks of 4 eggs, season with salt and cayenne pepper, and make into balls; place a layer of chicken in the bottom of the dish, over this a layer of ham. Place the forcemeat-balls amongst the meat, strew over them some chopped mushrooms (or truffles, if wanted extra good), pour in the gravy, and cover with good puff paste, and finish in the usual way. If quantity and economy are required,

add 3 or 4 hard-boiled eggs, and put in sausage meat instead of the forcemeat.

Venison Tartlets.

If there is a little cold venison left, it may be hashed, and hashed venison is of course a great and well-known favourite. But if this has been done, and a change is required, the following will yield a nice little cold entrée: Mince the venison and make it into a venison *salpicon* as for *croquettes*; fill some puff paste tartlet cases with this; when cold, pipe a rim of red currant jelly round the edge, and a button of the same in the centre on the venison. Serve cold, with a little chopped aspic over the surface. For hotel use, at luncheons or dinners.

Sausage Rolls.

Roll puff paste very thin, and cut out in pieces $3\frac{1}{2}$ by $3\frac{1}{2}$ ins., lay sausage meat made into a roll about the size of your largest finger through the middle; damp the edges and bring the paste over the meat to join the other side; wash over with yolk of egg; ornament them with cut paste leaves, or cut them with a knife two or three times through the thick part slantwise. Sausage meat is usually obtainable from the pork butcher; but if you prefer to make it, the following recipe may be recommended; 1 lb. pork, fat and lean, 1 lb. lean veal, $\frac{1}{4}$ lb. suet, $\frac{1}{2}$ lb. bread-crumbs, five sage leaves, $\frac{1}{2}$ teaspoonful of pepper, 1 of salt, and $\frac{1}{2}$ of marjoram. Be careful that the meat is free from skin and sinew; chop very finely, add the bread-crumbs and seasoning, and mix well together.

Oyster Patties.

Cut some pieces from puff paste as for tartlet cases, wash them over with yolk of egg, and bake carefully. Cut out a smaller piece, wash over with egg; put a paste leaf upon it, and bake: this will be for the cover. To make the paste leaves, cut out some short paste; pinch one end between the thumb and finger of the left hand; lay the back of the knife down the middle, and then crimp it on each side of the line in a slanting direction; fill them with the following preparation:

To prepare Oysters for Patties.

1 oyster for each patty-case; warm them in their own liquor; be careful not to boil. Strain and beard them. Make a sauce as for melted butter, only with the liquor from the oysters; season; add a little cream; put back in the stewpan. Keep all warm till

required; then put 1 oyster in each case; fill with the sauce; put cover on; send out with parsley garnishing.

Pastry Cheese Straws.

Mix 2 ozs. grated parmesan cheese, 2 ozs. old and dry ditto, 4 ozs. butter, 6 ozs. flour, 2 yolks of eggs (flavour with cayenne, salt, and a little powdered mace) into a stiff paste, roll out ¼ inch thick; cut this into fingers three inches long, the same width as thickness; bake quickly.

(1) Cheese Cake Mixtures.

½ lb. sugar, ½ lb. butter, ¼ lb. ground almonds, 5 eggs, ½ lb. flour, 1 oz. powder; cream and mix as for cakes.

(2) Cheese Cake Mixture (Called by the Trade "Cheese Curd").

½ lb. stale sponge cake rubbed through a sieve, 6 ozs. castor sugar, ½ lb. butter, 3 eggs, 4 yolks, ¼ lb. potatoes boiled and mashed, a little grated lemon-rind, and 4 drops essence of lemon. Cream the butter, sugar, and eggs the same as for cakes, then stir in the mashed potatoes, flavourings, and sponge cake powder, and, if preferred, 2 ozs. ground almonds. This mixture should be used up in a few days, and should be kept in a basin or pan for use.

Common Curd.

¾ lb. flour, 6 ozs. sugar, ¼ lb. margarine, 1 oz. powder, essence of lemon; rub all fine together; wet up with water.

(3) Cheese Cakes.

Cut from puff paste that has had an extra turn, or from the cuttings left from tartlets, some circular or oval pieces with a fluted cutter, the size of the patty-pan it is to be baked in; press the middle out a little thinner than the sides, to prevent the bottom from rising up and displacing the cheese curd during the baking. Place this in a patty-pan, and put a piece of cheese curd in the middle of the pastry, and bake in a sound oven. If, when baked, the cheese curd is found to be too firm or dry, beat up ½ egg and 1 oz. of butter, and add it to the curd to make it lighter; if it should be too soft, and run over the paste, add 1 oz. more sponge cake to the mixture to stiffen it.

(4) Cheese Curd.

Turn 4 quarts of milk with rennet or lemon juice, or a pinch tartaric acid, drain off water, beat the curd up with ½ lb. butter, then beat in 4 yolks, ¼ lb. fine biscuit powder or 3 ozs. powdered sponge cake, the rind of 3 lemons, the juice of 1 lemon, 6 ozs. sugar; beat until creamed, and use a spoonful in short paste in the ordinary way.

Cadogans.

Cut out paste as for cheese cakes, place in deep patty-pans, and into each of them put a table-spoonful of the following preparation: Break up fine, in a pan, ¼ lb. stale macaroons or any kind of almond goods, add ¼ lb. castor sugar, 2 eggs and 2 yolks, 2 ozs. butter slightly melted, 2 ozs. candied orange-peel cut *very* fine. Beat this mixture with a wooden spoon for several minutes, and use a tablespoonful, as directed above. When in the pastry-cases dredge some fine sugar over them, sprinkle with water, and bake the same as for Coventrys.

French Congress Tarts.

¾ lb. ground almonds, 1½ lb. sugar, made into a soft paste with white of egg; beat this with a wooden spoon for a quarter of an hour, line some patty-pans with paste, place a piece of apricot or greengage jam (about the size of a walnut) in the bottom, then upon the top of this put a teaspoonful or more of the almond batter; give puff-paste cuttings an extra turn or two, and cut into narrow strips about an inch long; lay these in the form of a star, or across each other on the top, and bake.

Almond or German Cheese Cakes.

½ lb. ground sweet almonds, ¼ lb. sugar, 2 eggs, 4 yolks ditto, a pinch of powdered mace, a little grated lemon peel, and 6 ozs. melted butter. Beat the eggs, sugar, almonds, and spice together in a basin with a wooden spoon for ten minutes, melt the butter, mix all together, and put a tablespoonful of the mixture into patty-pans lined with puff paste; before putting them into the oven, put a small piece of fresh butter on each.

Vanilla Sandwiches.

Make two long strips of puff cuttings about 3 inches wide, and rolled very thin; prick and bake. Prepare a custard with 2 ozs. cornflour, 4 eggs, pint milk, 3 ozs. sugar, and essence of vanilla. When cooked, spread this on the baked pastry slices; cut in fingers, and ice over top, using water icing or fondant.

Almond Tart.

½ lb. ground sweet almonds, 10 yolks, a pinch each of ground cinnamon and ginger, ¼ lb. sugar, 1 pint of milk, and ½ lb. Savoy finger biscuits. Beat the yolks and stir them over the fire until they thicken, then mix all the other ingredients, and put into pastry-lined pans (one or more), and bake in a moderate oven. When baked, stick shredded Jordan almonds on the top.

Apple Tartlets.

Pare and core 12 apples, put them into a stewpan with a gill of water, ¼ lb. sugar, and the juice of a lemon. When sufficiently done, cut out ordinary tartlet cases, or a large-sized rather narrow oval dish, fill with the apple, and bake in a fairly hot oven. Boil down the liquor the apples were stewed in to a thin jelly, and when the tartlets are baked, pour some of the syrup over them, then sift castor sugar on them, and place a dried cherry on the top of each tartlet.

Apple Tart (Open).

Line a flat or shallow oval dish with puff paste cuttings rolled out thin, prepare some apple pulp by boiling apples in sugar or syrup, flavoured with cloves, and spread this about half an inch thick on the paste. Cut very thin strips of paste, twist them slightly, and lay them in cross-bars over the tart; bake in a good sound oven. Prior to baking, blanch a few almonds, cut them in long strips, and place them on the top of the tart.

Fried Puffs or Cannelons.

Roll out some puff paste into a thin sheet, cut it into strips about two inches by six. Spread these with jam or freshly stewed fruit; wet the outer edges, roll up lengthwise rather loosely, and fry in boiling fat; after a minute or two draw the pan on one side of the fire to finish the puffs, or they will brown too much; drain them upon thin paper, etc.

Fanchonettes.

There is no reason why the "Fanchonette," as used at dinner parties, should not make a good article for first-class shop-sale. The great majority of my readers know what a "fanchonette" is; but in case a few do not, I will just remark that it is a tartlet baked with a little jam in the bottom, and a little stiff-cooked custard or cheese cake mixture over the jam. When baked, they

are masked for half an inch or more with *meringue*, and piped on the surface with some of the same material as decoration; then dredged with pulverised sugar, and dried in the hot closet or very cool oven, as for spoon *meringues*. The best plan to adopt for shop work would be to make "fanchonette tops," and keep a stock of them in tin boxes, making from day to day what tartlets you require, and sticking the tops on with a little icing. The tops can be piped on to slips of foolscap paper, or tins previously greased and floured, so that they will slip off easily when baked and cool. The "fanchonette" will keep three or four days.

Scotch Cheese Cakes.

Line patty-pans with a short crust, fill with cheese cake mixture No. 1; place 2 strips of paste in the form of a cross on top of each; bake in a warm oven.

Rice Cheese Cakes.

Cut out short paste, line patty-pans; next make the following mixture: Cream 12 ozs. butter, 12 ozs. castor sugar, 5 eggs added by degrees, a few drops of essence of lemon; then take ½ lb. ground rice, previously stewed in ½ pint milk in a clean copper pan till quite stiff, and mix all together. Fill and bake in a moderate oven.

Strawberry Tartlets.

Cut out some sweet short paste, place in patty-pans, bake in a moderate oven, of a golden colour. Then put into a clean stewpan 1 lb. castor sugar, the juice of 1 lemon, and ½ pint water; place this over a clear fire, let it simmer till a syrup; have ready 1 quart of strawberries, place these into the syrup, simmer, *not boil*, for a few moments; then put three or four of the strawberries into each shell, reduce the syrup a little, and place a spoonful over the fruit in each tart; colour syrup with carmine.

Banbury Cakes.

Cut out puff paste into flat oblong pieces, and put this mixture into them: Take 12 ozs. of butter, *cream*, add 12 ozs. sugar, 6 eggs by degrees, a little grated nutmeg, 1¼ lb. currants, 4 ozs. of finely chopped lemon peel, ½ lb. flour, and 2 ozs. stale sponge cake grated very finely; mix thoroughly, and fill; make of an oblong shape, place close together on your paste slab, sugar over with fine sugar, ard bake in a moderate oven.

Eccles Cakes.

These are generally made from the scraps or cuttings of puff paste. Roll out as for Banbury; cut out with a smaller cutter; mix together 1½ lb. currants well cleaned, and ½ lb. brown raw sugar, a little ground nutmeg, and 2 ozs. finely chopped lemon-peel. Place a little of the mixture on each piece of paste, fold up in a round shape, roll out round, say two inches in diameter, sugar over, and bake in a moderate oven.

French Apple-turnovers.

Peel and core 6 apples, put them in a stewpan with ¼ lb. of sugar, a piece of butter the size or a walnut, the rind of a lemon rubbed on a piece of sugar; add an eggcupful of water, and let the apples stew for 15 minutes, frequently shaking them up to prevent burning; stand them on one side to cool. Line some small round patty-pans with short paste, or pastry-cuttings; put in 2 or 3 of the quarters of apples; put a teaspoonful of apricot preserve upon them, and cover them in with puff paste cut out with a round cutter the same as for mince-pies; pinch the outer edge all round with the finger and thumb in the form of a cord, or the same as you would shortbread; wash the turnovers with white of egg and water, dredge with fine sugar, slightly sprinkle with water, and bake in a moderate oven. This kind of turnover can be made from any sort of fruit, using a little of the same kind of preserve; but plums or peaches should be stoned before being put into the turnover; they can be made any size, for one, two, or more persons.

Brandy-Bread Tartlets.

Beat up 2 yolks and 5 eggs, dissolve 6 ozs. butter in a pint of milk, and pour it hot over 1 lb. bread crumbs; when cold pour in the eggs, add ½ lb. sugar, ½ lb. sultanas, a few gratings of nutmeg, and a glass of brandy; line patty-pans with puff paste cuttings, put in a spoonful of the mixture, and bake in a good oven.

Chocolate Tarts.

Prepare a custard of 2 ozs. chocolate, a pinch of cinnamon-powder, 2 ozs. finely chopped lemon-peel, ¼ lb. sugar, 2 ozs. ground rice, 1 pint milk, and 5 eggs; beat the eggs, and steadily mix all the ingredients together, and stir over the fire until it thickens as an ordinary custard, but do not let it boil or curdle; let it cool, and then pour into patty pans lined with puff paste; bake in a sound oven.

Tart "De Moi."

Line a tart-mould with a rim of light puff paste, then fill it with alternate layers of grated biscuit or macaroons, shred marrow or veal suet, and different kinds of sweetmeats until your dish is sufficiently filled. Then boil a quart of new milk, a lump of butter, a table-spoonful of sugar, and a dessert-spoonful of rose water; thicken it with 4 well-beaten eggs, pour it into your pie-dish, and bake for an hour.

Fancy Custards.

Line a patty-pan with the cuttings of puff paste, or good short crust, place a teaspoonful of jam in them, and a teaspoonful of custard over it, bake in a good oven; when cold, ice with water icing, or an icing made with 1 white of egg to 1 oz. sugar; spread this over the top of the custard; sift fine sugar over it, and put inside the oven for one minute to set.

Pastry Sandwiches.

These are cut from puff paste, in fingers about half an inch square and three inches long; they are laid upon tins, with the cut sides forming the top and bottom; the effect of this is that, instead of rising upwards when exposed to the heat of the oven, they spread out flat upon the tin. When baked, spread them with apricot, greengage, or any kind of preserve; place them in pairs, and then ice them with water ice, prepared thus: 2 whites of eggs, 2 table-spoonfuls of water, and enough icing-sugar to make it into a thick syrup. Cover the top of the sandwich with this, and put into the oven to set firm, but do not allow it to discolour.

Pair Pastry.

When cutting out puff paste, cut a certain portion into small oblong squares; after washing as usual with egg, place two small dummies side by side on each piece of paste. Bake as usual; remove the dummies; this will leave two little wells side by side in the paste; fill one well with cooked custard cream, and the other with strawberry jam. This will give a pretty pastry combining both strawberry and cream, to sell in the shop or restaurant at either 1*d*. or 2*d*., but if the latter, cut the paste a little thicker, and perhaps pipe a thin, neat ring of icing round each well.

Apricot Tartlets.

These are very stylish in appearance, while they eat as good as they look; they are much simpler in preparation than the cherry tartlets. Prepare the cases as for the latter, and put a

half apricot into each tartlet, then pipe a rim of red-currant jelly round each tartlet. If for dinner-parties, etc., the apricots and juice can be turned into a basin, kept on ice in the refrigerator, and put into the tartlet cases just before serving, when they will eat deliciously cold.

French Apricot Tart.

Roll puff paste thin, then cut out a piece the size of a plate; lay this on a clean baking-tin; wet round the edge with your paste brush, then place round a border one inch wide; ornament round the border a little; dock the paste over with a fork to prevent it from blowing; sugar over with fine sugar, and bake a nice golden colour in a moderate oven. See that it is properly baked; if not, it will fall when taken from the oven. Then take, say, a dozen apricots, not too ripe: cut them in halves, break the stones, and blanch the kernels by placing them in boiling water for a few minutes as you would do almonds; place in a clean stewpan 1 pint cold water, 12 ozs. white sugar, the juice of 1 lemon; and let this come to a simmer to dissolve the sugar; then place in the apricots; let them simmer very slowly for about five minutes. Take them out very carefully on to a dish; reduce the liquor to a thick syrup, then add a wineglassful of sherry; place the apricots very nicely round your tart, filling it all over inside the border; pour the syrup over; place a kernel in between every other apricot, then a crystallized cherry; and ornament the border with a little red jelly. This is a very nice tart.

Orange Tart.

Extract the juice of three oranges and boil the rind and pulp till quite tender; add to the juice and pulp 3 ozs. sugar and 2 ozs. butter. Line a shallow tart-tin with good puff paste, and when about half baked fill with the orange paste and set in a quick oven to finish.

Orange Tart (another way).

Take 4 sweet oranges, 3 ozs. of loaf sugar, 2 eggs, 1 oz. of butter, 2 slices of plain cake, and a little milk. Butter a pie-dish, and lay in the cake previously soaked with milk. Wipe the oranges, and rub the lumps of sugar over the outside of the rind to obtain the aromatic flavour which it yields; then remove all the white peel, and pound the pulp with the sugar, keeping back the pips; add the yolks of the eggs and butter slightly melted; mix thoroughly, and pour over the cake. Whip the whites of eggs to a firm froth, add a little sugar, pile roughly on the top of the orange mixture, and bake in a moderately hot oven to a pale brown colour. Sift a little white sugar over, and serve hot.

Cream Tartlets.

Make ordinary jam tartlets; place 1 teaspoonful of custard on the jam, and on the top of the custard put a small spoonful of *meringue* mixture (made with 1 oz. of icing sugar to each white of egg according to the quantity required), bake in a moderate oven, add the *meringue* when the tartlet is baked, then put back for a few minutes to set.

Cherry Tartlets.

Make tartlet cases with either puff or tart paste, keeping them well open during baking with well-rounded dummies. Stone some red cherries without disfiguring them; put them into a stewpan, add (according to judgment) some pulverized sugar, toss them up together to coat the cherries with the sugar, and boil up for two or three minutes, according to quantity. Now strain the juice from the cherries, placing the latter in a basin; replace the juice in the stewpan, colour with cochineal, acidulate with a little lemon-juice, boil up, and while boiling, stir in a very small quantity of raw arrowroot or corn flour mixed with cold water, just sufficient to slightly thicken the juice without making arrowroot-pudding of it, or letting the use of arrow root be detected. Pour this over the cherries; when cold, fill the tartlets, and pipe a rim of whipped cream round each. I do not introduce cherry tartlets as anything of a novelty; but this style of making them is not usually adopted, and so made, they eat delightfully fresh and do not cloy the palate; while the bright red of the cherries and juice contrasts with the white cream rim in a manner which would probably please an artistic eye.

Small Pastry Custards.

Prepare this mixture, viz.: 1 pint milk, 1 oz. cornflour, 4 eggs, 2 yolks, the rind of 1 lemon, and about ¼ lb. sugar, 3 drops essence of lemon. Boil up milk, cornflour, lemon, and sugar, take out the lemon-rind, whip up the eggs, and stir in slowly. Line some patty-pans with puff paste cuttings, crimp or notch the outer edge neatly, nearly fill with the custard, grate a little nutmeg on the top, and bake in a moderate oven.

Pigeon Pie for four Persons.

Cut off feet for top of pie. Take 3 fresh pigeons, divide in two from head to tail, mince the livers with parsley, and put inside; then a seasoning of pepper, salt, and a piece of butter; place on the bottom of dish about ¾ lb. good rump steak cut into strips, seasoned and rolled loosely, lay the pigeon upon

the steak, and a half of hard boiled egg between each of them; put a little more seasoning and a piece of butter on the top, pour into the dish ½ pint clean stock; or wanting this, dissolve a little gelatine in extract of beef and water, season, and pour over; line the top part inside and top edge with paste, and put a good thick crust of puff paste, wash over with yolk of egg, make a hole in the top, scald and skin feet (3 or 4), stick in the hole, toes upwards, and bake thoroughly in a moderate oven.

Chelsea Cheese Cakes.

Line patty-pans with puff paste cuttings; roll smoothly; press and prick the bottom to prevent puffing; put in them a spoonful of the mixture called Chelsea curd, made as follows—8 eggs, 6 ozs. sugar, 6 ozs. butter, cream as for cakes, flavour with essence of rose, almond, or vanilla; put this mixture in a saucepan, gently bring to a simmer, but do not let it boil; stir; it is then ready for use; when in the pans, put a piece of citron or glacé fruit on top; dust with fine sugar, and bake.

Cocoa Cheese Cakes.

Cream ½ lb. butter, ½ lb. sugar, 3 eggs, add 2 ozs. powdered sponge cake and ½ lb. desiccated cocoa nut, place spoonful of this in the usual short paste.

Cleveland's Custards.

Boil together for a minute 1 quart milk, ¾ lb. of finest patent middlings flour, ½ lb. fresh butter, ¾ lb. sugar, pinch of salt, 1 gill orange flower water, 6 ozs. chopped almonds; make all into a stiffish custard; bake as usual in short paste-lined pans. Sprinkle with sugar.

Genoese Pastry.

½ lb. of castor sugar, ½ lb. butter, ¾ lb. eggs, ½ lb. flour, a small glass of brandy, 3 drops essence of spice, ½ oz. of powder. Put the eggs and sugar into a pan, beat vigorously five or ten minutes; melt the butter slowly, but not hot, pour it into the eggs and sugar, add brandy and flour, mix gently; place upon a buttered tin, spread it about a half inch thickness. The edges require blocking with small pieces of wood to prevent them spreading. Bake in a moderately hot oven a rich yellow, and put away in a cool, moist atmosphere; it will then become soft, ready for cutting with a paste-cutter or sharp knife into small circular, oval, leaf-like, diamond, or any other fancy shape. Cut them through, spread with a variety of bright-coloured

preserve, place together again, and cover the top with pink and white icing. This may be ornamented in various ways according to taste: with pistachio, neat strips of jelly and bright dots of an opposite colour; or *meringue* mixture, which should be piped upon the shapes, dust with fine sugar, and dry in the screen. The following is another mode of ornamentation. When nearly baked, take it out carefully and wash lightly with egg; sprinkle with chopped almonds and coarse sugar-crystals, and put it back to finish baking; when cold cut into shapes.

Genoese paste can also be used for the framework of *gâteaux*, etc., flavoured with lemon or vanilla to taste. This very light mixture is very good for small moulds.

Marbled Genoese.

Make a sheet of Genoese cake; the next day shave off the upper skin or crust with a sharp knife. Presuming that the cake is one inch in thickness, cut it into strips about three inches in width; split these, and sandwich them together with some dark jam; now mask the top surface with some fondant icing, and, before it sets, *marble* it over the surface by *veining*, or drawing alternate coloured lines, and then drawing zigzag lines across with a wooden skewer, or preferably with a coarse steel tooth comb, as used by grainers, or a piece of stiff cardboard, cut in shape of comb. Now cut it into fingers of about an inch across. These will keep for a week, and will sell at a profit for 1*d*., although 2*d*. may well be charged.

Note.—I want to suggest or impart a new idea of ornamentation for this kind of work, and if you know how those very artistic marblings and stainings are put upon the edges of books, you will catch on quickly, for the principle of the work is analogous. First, a very soft, pliable icing, and quickly alternate lines of any number of colours; and then a dexterous wrist, making short or long or eccentric sweeps with the steel comb, and these colours are intermingled, but as regular and beautiful as are the rays in a rainbow, or as vivid and bold as are the cloud tints cast at the beginning of a sunset.

FANCY GOODS, ETC.

African Shoots and Fancy Shapes.

HALF-POUND butter, 1 lb. castor sugar, 1½ lbs. flour, 4 eggs, 6 drops essence of lemon, enough milk to make them into middling firm dough. Cream the butter, sugar, and eggs as for cakes; when creamed, add the other ingredients and mix lightly; it will then be ready for forcing through the shoot, which should be furnished with three or four different designs or slides. Put one of these designs into the tube, put some of the mixture in, and then with the plug force it through in long strips upon the board; change the design each time until the mixture is used up, and then cut the strips in lengths, and make them into various shapes, fingers, rings, crowns, Prince of Wales's feathers, etc.; place these upon baking-tins, and bake in a hot oven. Do not work the mixture about after it is mixed, or it will become tough and difficult to force through the shoot.

Walnuts.

3 lbs. flour, 1¼ lb. sugar, 1½ lb. butter, 3 eggs, volatile size of a bean, dissolved in milk, enough to make a firm dough. Mix same as for wine-biscuits. Fill up the walnut moulds, cut off the loose dough close to the board or mould, knock them out, place upon tins flat side downwards, and bake in a good sound oven. When baked lightly, touch the flat side with white of egg, and stick two halves together.

Walnut and Cocoanut Cream Nuts.

Prepare a cream, *i.e.*, fondant, by boiling to the ball or 240° to 245° Fahr. 12 lbs. of sugar with 2 lbs. glucose, in 4 pints of water, adding no cream of tartar. Boil in the usual manner to the degree given, then remove from the fire; then turn it on your marble or slate; add ½ oz. gum-arabic dissolved in as little water as possible. Now with your spatula work it backward and forward until it assumes a creamy appearance. When creamed enough place it by for use. When you need to use any take what you wish, dissolve it over heat in a suitable vessel, and turn it on your marble, or use from the kettle containing it, as the case requires. You can colour, also flavour it as desired. Have ready the halves of English walnuts, skinned, also have your cream (white) just soft enough to handle or spread with a knife; then take half a walnut, spread on it a little cream, and

press on the other half walnut. Press the two together so that the cream is forced beyond the edges of the walnut, then place them away to dry. When dry, crystallize them or not, as you desire. Walnut cream is the same cream with chopped walnuts worked in it, as many as possible in reason, then pressed out in a cake ½ inch thick, and for sake of appearance both sides covered with a thin layer of pink cream. When the cream is fully set, cut through in ¼-inch slices.

Ratafias.

½ lb. ground sweet almonds, ½ lb. ground bitter ditto, ¼ lb. rice flour, 2¼ lbs. castor sugar, 12 whites of eggs (good size). Put this mixture into a pan or basin, and well beat it with a wooden spoon for about three-quarters of an hour; it will then be a light and smooth paste. Place some of this in a forcing bag, and drop small buttons upon smooth paper. Sift fine sugar on them, place the paper on a tin, and bake in a cool oven. When cold, pick them off the paper; it will not be necessary to wet the paper. The quantity and quality of the white of an egg varies according to the freshness of the egg and breed of the fowl. It will therefore be necessary, when making ratafias and macaroons, to try a few before baking the bulk. When the mixture is ready, run a half-dozen out and put into the oven; if they "flow" out too flat in the oven, add a little more almond or a pinch of flour; but if too firm, with a rough surface, add another white and beat for a few minutes. It is usual, when running out almond goods, to use a bag made of a bullock's bladder, with a hole in the point, through which the pipe or tube is pushed and securely tied. The soft mixture penetrates very freely through cloth or canvas, and is unpleasant and wasteful. The bladder, when used, should be scraped, and not washed. The size of the pipe or tube for ratafias should be half an inch, and for macaroons three-quarters of an inch.

Macaroons and Almond Cakes.

Castor sugar 2¼ lbs., 1 lb. ground sweet almonds, 11 whites of eggs. Prepare the mixture as for ratafias, and when ready run out on wafer-paper placed upon a tin. Blanch some sweet almonds, cut them in slices lengthways, place two pieces upon each macaroon, bake in a cool oven. It is absolutely necessary that wafer-paper be used (it can be eaten with the biscuit), as it is next to impossible to take these biscuits off paper without wetting it, which is likely to spoil them. When the ratafias or macaroons are upon the paper, before going into the oven, lightly dust with fine sugar through a wire sieve.

Spanish Macaroons.

1 lb. almonds, 1 lb. sugar, 12 yolks of eggs, ¼ oz. powdered cinnamon, and the grated rind of a lemon; boil the sugar to the blow, that is, until you can blow it through the holes of a perforated spoon in transparent bubbles, etc.; add the almonds, etc., and simmer ten minutes; add the yolks, and stir rapidly until it thickens, then take it off and pour it on to sugar spread upon a board or slab, mould it into small balls, roll in sugar; put upon wafer-paper on tins, and dry.

Almond Raspberry Sandwiches.

Take ½ lb. ground almonds, ½ lb. castor-sugar, and ¼ lb. flour, and make into a firm paste with eggs. Break up some stale sponge or other cakes, and make it into a smooth paste with raspberry jam. Roll the almond paste into a very thin sheet, roll out the raspberry jam paste into a sheet not quite so thin, and place it between the almond paste, so that the latter forms the top and bottom layers; cut this into sandwiches or pieces about 1½ by 3½ inches; bake carefully, merely setting the mixture, and ice pink and white with icing slightly favoured with essence of raspberry.

Victoria Sandwiches.

1 lb. butter, 1 lb. sugar, 1¼ lb. flour, 12 eggs, half teaspoonful of carbonate of soda and cream of tartar, sifted with the flour. Cream the butter and sugar, adding the eggs and flour as for cakes. Spread this mixture in sandwich tins about one-quarter inch thick, and bake in a sharp oven. When baked, spread with greengage or other preserve, place two layers together, and cut into eight parts. These sandwiches are properly served whole, iced with the usual water icing fondant, and ornamented with nonpariels and loaf-sugar broken small and made pink with cochineal, or glacé fruit and piping.

Meringues and Cream.

1 lb. very fine sugar and 8 whites of fresh eggs. Whisk the whites in a pan until they are quite firm, and resemble a mass of hard snow. The mixture will require about half an hour's vigorous beating; mix in while beating a half of the sugar; then take a wooden spoon and carefully and lightly mix in the remaining sugar. The moulding or shaping of these biscuits is rather difficult for beginners. The plan adopted in the ordinary bakehouse is as follows: Slightly butter and flour a thick baking-sheet, fit a large-sized pipe or tube into the savoy bag, fill it with the

mixture, and run it out upon the floured tin as near the shape of a small egg as possible, each one an inch apart. Sift some sugar over the *meringues* through a hair sieve, and put them to bake or dry either in a *very* cold oven or in the biscuit-drying oven. When thoroughly dried through, take them off the tin with a palette knife; and after carefully scooping out all the moist inside, or pushing the bottom in with greased end of an egg, dry and put them away in tins in a warm dry place for future use. More proficient workmen gather the mixture up in a spoon, drop it upon paper in the shape of an egg, sift some loaf-sugar dust over them, shake it off the same as for "savoy fingers," stand the papers upon thin boards (seasoned to stand the heat) or tins, and bake in a very cold oven. When sending them to table, flavour some double cream (that will whip) with a drop or two of essence of vanilla or other essence, and an ounce or two of fine sugar, and then whip it until it will stand in the position you place it, but be careful that you do not whip it into butter, or approaching to butter; fill the *meringues* with this cream, place two halves together, and dish for table. This mixture can be used in a variety of ways for ornamenting sweet dishes for dessert. A savoy bag filled with the *meringue*, and fitted with a small tube or pipe, can be made to produce many designs, which should be dusted with sugar, and dried in the screen or oven.

Shortbread.

1 lb. flour, ¼ lb. sugar, ½ lb. butter. 2 eggs, pinch of powder. Rub butter and flour together, give the sugar and eggs a little mixing, put all together and knead well, rubbing it down with the hand upon the table until the whole is a smooth compact mass; break it into sizes required, mould them into shape, flatten out a little, and with the thumb and forefinger "pinch" the edges; place upon a baking sheet, and ornament the tops with designs of neatly-cut lemon peel and caraway comfits. Bake in a sound oven.

Scotch Shortbread (Rich).

3 lbs. flour, 1 lb. sugar, 2 ozs. citron, 2 ozs. almonds chopped, 2 lbs. butter. Mix as before.

Scotch Shortbread (Plain).

4 lbs. flour, 1¾ lb. butter, 6 ozs. sugar, 1 oz. caraways, 1 oz. powder, and about 4 table-spoonfuls of milk. Rub them

all together into a firm, smooth mass; make them into square cakes ½ lb. each; pinch up the edges with the thumb and forefinger, cut out shamrock, thistle, or other ornaments in citron or candied peel; lay on the top (press in a little) a few caraway comfits, or pipe them with the usual complements of the season in pink and white icing-sugar, or write upon them "We're a' John Tamson's bairns," "Scotland yet," "Ye ken wha fra," "Peace and Plenty," "For Auld Lang Syne," "The Land o' the Leal," etc.

German Shortbread (½d. each).

1½ lb. flour, 10 ozs. sugar, 10 ozs. butter, 1 oz. ammonia, 5 eggs; mix the butter, sugar, and eggs; then mix in flour, etc., into smooth dough; break into 1 oz. pieces, and roll into fingers; twist into the letter S, flatten them, wash over with yolk, cut down the middle, and bake in good heat.

Neapolitan Sandwiches.

½ lb. ground almonds, ¼ lb. fresh butter, ½ lb. sugar, 10 ozs. flour, 8 yolks of eggs, cream, butter, sugar, and eggs as for cakes. Work in quite smooth the almonds and flour, and put in a cold place to set firm; then roll paste thin on pasteboard, and cut out circular pieces size of cheese plate, put upon baking-tin, and bake in a sharp oven until set firm: when cold, jam them as for other sandwiches, place them all on top of each other, and then ornament the top with pink icing, meringue mixture, etc. Colour some chocolate and some red, and alternate layers when putting together after baking.

A Trifle.

Make a "whip" some hours before it is wanted to be used, of a quart of double cream or very thick cream, 1 glass of sherry, the rind of a lemon, and ¼ lb. fine sugar; whip vigorously, take the froth off as it forms, lay on a sieve to drain. Put in a trifle dish, ¼ lb. ratafias, ¼ lb. macaroons, few sponge biscuits, some melted calves'-feet jelly; put this in the refrigerator to set; put ½ oz. isinglass in table-spoonful warm water to dissolve; when melted, mix with 1 pint of thick cream, 3 drops essence of lemon, 2 ozs. sugar, and a glass of wine, pour this over as soon as it is mixed or it will set too firm to pour out; when on the jelly, ornament with bright jam, etc., and then pile on it the whipped cream that has been set to drain.

Charlotte Russe.

Line a jelly-mould with savoy-fingers, by placing them evenly side by side all round the mould, covering it all up: the place

left in the middle cover with a star or piece cut for the purpose. Dissolve ½ oz. of gelatine in as little water as possible, whisk a pint of cream, add to it 2 ozs. of castor-gugar and ½ lb. of jam, strained through a fine sieve. Mix the whole together, fill the mould, cover with a piece of sponge cake cut to fit, and set it to freeze. When well frozen, turn out and serve.

Gauffres.

Cream as for cakes, 1 lb. fresh butter, 1 lb. loaf sugar, 1 lb. eggs, gill of brandy, 4 drops essence of vanilla, and a pinch of powdered nutmeg: stir in 1 lb. fine flour, put on buttered baking-tins, the same as for jumbles, allowing plenty of room to spread; before quite cold, curl or roll them, and sift white sugar over.

Little Mazarins of Lobster.

Set in ice as many copper dariole plain moulds as you may require; open a can of lobster, cut up some of the most ruddy parts, with which cover the bottom of the moulds; pour a layer of bright aspic jelly on this, to set the lobster firmly in; then mask the interior with *whipped* aspic jelly, cut up the remainder of the lobster, or roughly chop it; add mayonnaise sauce and aspic jelly or plain gelatine to it, sufficient to ensure its setting firm; season it to a piquant degree, then fill up the interior of the moulds with the mixture. When one of these mazarins is turned out, by dipping in warm water, as for a mould or jelly, it will form a tasty and attractive little tit-bit, the top showing the red lobster embedded in the crystal aspic, the whipped aspic sides showing a marble whiteness, and the interior, when cut or spooned, shows a creamy, solid mixture of lobster mayonnaise.

Little Mazarins of Salmon.

Proceed as for lobster mazarins, using canistered salmon, and omit the setting of fish with aspic into the bottom of the mould; but mask the whole of the interior with the whipped aspic jelly.

Mayonnaise Eggs.

Boil some eggs hard; shell and put into cold water, cut off a sufficiency of the broad tip, insert a small spoon and remove the hard yolk, pass the yolk through the hair sieve into a small basin, and with a wooden spoon stir oil, vinegar, etc., into it, with sufficient condiments to produce a stiff and very tasty sort of mayonnaise, fill the eggs with this mayonnaise, and stand them on a dish or plate. For hotel, restaurant, or bar.

Chicken Roll.

Make a *salpicon* of mixed chicken and tongue, with a rather stiff white sauce. Have some small long narrow rolls made; cut them in half lengthways, nearly through; scoop out a certain portion of the interior, but not too much; fill it up with the chicken *salpicon*, close over, and send out in the picnic or luncheon basket. Suitable for picnics, travelling, hunting, etc.; handy for hotel use also.

Butter for Sandwiches.

Beat ½ lb. or 1 lb. of butter to a cream, with a wooden spoon, in a basin; a *very little* salt and mixed mustard to taste. This will keep for three weeks or a month, if kept in a cool, dry place. Use it as required for buttering the bread for sandwiches. It is a great improvement on the old-fashioned way of preparing sandwiches; is better eating, is far quicker, and more convenient.

Chartreuse of Oranges.

Cut 5 oranges into pieces the shape of the quarters, but only about a quarter-inch thick. Dip each piece into clear, stiff orange jelly, and arrange round the bottom of a plain tin, filling up the centre with pistachio nuts, then lining the sides of the mould with the quarters of orange, one row turning to the right, the other to the left alternately, until the mould is full, the pieces of fruit just overlapping each other. Then fill in with about three-quarters pint whipped cream, flavoured with vanilla, brandy, or other flavouring, adding a very little isinglass and sugar (dissolved). When it has quite set, turn out into a glass dish, and, if liked, a little more cream may be poured round and garnished here and there with pounded pistachio nuts.

The Raspberry Basket.

Take a good-sized glass basket, place in it six sponge cakes, soak in the juice extracted from a quart of raspberries, sweeten to taste. Take some whipped cream, slightly sweetened, and cover the cakes, except in the centre, where some whipped cream slightly coloured with cochineal can be placed. Put round bunches of raspberries garnished with leaves, alternately red and white. Twine gracefully round the handle bunches of red and white raspberries mixed with leaves.

Lobster Snack.

Take a good tin of lobster, pick out any stray bones that may be in it, chop it up. Place an equal weight of fresh butter in a

basin, beat it with a wooden spoon until it is well creamed; add the lobster, stirring it well in. Stir in flavouring—according to taste and judgment—of anchovy sauce, salt, pepper, and vinegar. To serve, take an ordinary small rasped dinner roll, cut it across into two, place a good teaspoonful of the lobster butter on each piece, spread it smooth and serve on a small plate. This forms a very appetising luncheon tit-bit. It should be especially useful for luncheon-bars. The lobster butter will keep good for a week or more. Proceed in the same way for salmon.

Raspberry Charlotte.

Butter a pudding-dish and cover the bottom with dry bread-crumbs. Put over this a layer of ripe raspberries, sprinkle with sugar, and then add another layer of crumbs; proceed in this way until the dish is full, having the last layer crumbs. Put bits of butter over the top and bake, with a plate over it, half an hour. Remove the plate and let it brown just before serving. Use only half the quantity of crumbs that you do of the fruit. Eat with cream.

BISCUITS (HARD AND SOFT).

Hard Biscuits.

HARD biscuits of all varieties are similar in mixing, kneading, and baking. When the butter and other ingredients are added, they have to be well rubbed in and shaken up by putting the hands underneath the roughly mixed dough, and tossing it up into the air until it is separated into small fragments; this is done to prevent any of the ingredients from remaining undistributed. It is then placed upon a "brake" and cut to pieces by the operator placing his whole weight upon the extreme end of the handle and moving it up and down; when the dough appears "clear" and "smooth," he gradually diminishes his weight upon the handle, folding it up repeatedly until it is finished. It should then be covered with a damp cloth, to keep it mellow, for an hour or two; and then cut out or moulded into shape, and baked in a hot oven. Care must be taken to keep the air from the dough through the whole operation until it is in the oven, or the beauty and finish will be marred.

If the old-fashioned biscuit-brake is replaced by the greatly improved biscuit-machine, so much the better for the worker and the goods he turns out; if so, then all that will be necessary is to properly adjust the rollers, whether for "braking" or rolling out for the cutters.

All plain hard biscuits should be well dried after they are baked, by putting them for some hours in the drying oven, screen, or dry warm place. If an amateur essays to make biscuits, he will always experience some difficulty in shaping or moulding them; when this is so it will be better to cut them out with a cutter. If penny captains, arrowroots, Abernethys, or biscuits of that class are wanted, proceed thus: Roll the dough out to a ¼ inch, cut out with a cutter, and then finish with a rolling pin, taking care to thoroughly dock them through before baking.

Thin Captains or Water Biscuits.

Fine flour 4 lbs., 2 ozs. butter, 2 eggs, and 1 pint water. Mix and knead as directed, and then roll out very thin, as thin as paper—in fact, the thinner the better; cut out with a cutter, dock them with a docker, very slightly dust a thin tin with cones or ground rice, lay the biscuits upon it, and put them into a very hot oven. If possible tilt the tin towards the furnace or fiercest part of the oven for a second or two, so that the heat may play directly upon the face of the biscuits, and raise small brown blisters upon them; then put the tin upon the oven bottom to finish. The oven must be red-hot, and the workman smart. Don't let them "perish" in baking.

Thick Captains.

Flour 7½ lbs., ½ lb. butter, 2 eggs, and 1 quart water. Mix as directed; when ready weigh off 2 ozs. each, mould, roll out, dock quite through, and bake in a fairly hot oven.

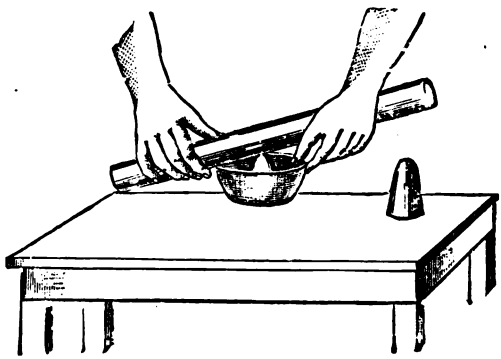
Abernethys.

Flour 7½ lbs., ½ lb. butter, ½ lb. sugar, 2 eggs, 2 ozs. caraway seeds, and 1 quart either milk or water. Mix, roll out, and bake as directed for thick captains, but in a somewhat cooler oven.

Penny Arrowroots.

Flour 8½ lbs., ½ lb. butter, ½ lb. sugar, 6 eggs, 2 ozs. arrowroot, ¼ oz. volatile, and 1 quart milk. Rub the butter into the flour, dissolve the sugar, arrowroot, and volatile in the milk, pour it into the flour, and mix as for other hard biscuits; when ready, roll out same as for thick captains, and then cup them upon the bottom of a gallipot, by placing them upon it, and working down the sides with the hands until deep enough; take them off, dock them through, bake in a moderate oven. If you wish to cup biscuits the same as the more experienced, mould them into the

shape of a sugar-loaf or cone, with a large base tapering to a point; place the rolling-pin upon the top of this point and press downwards (see illustration), rolling backwards and forwards as you proceed, but don't allow the rolling-pin to go over the sides; turn the biscuit round, and keep the rolling-pin upon the middle, until the sides are high enough.



Yorks.

Flour $3\frac{1}{2}$ lbs., $\frac{1}{2}$ lb. butter, $\frac{1}{4}$ lb. sugar, 2 eggs, 1 pint milk, and piece of volatile as big as a pea. Dissolve the sugar in the milk, and mix as for hard biscuits; when ready, roll out into a sheet a $\frac{1}{4}$ inch thick, cut some into strips 1 inch wide, stamp them, and cut off with a knife. Cut another portion into $\frac{1}{2}$ inch strips, stamp, and cut; make the remainder into various shapes; into fingers by cutting it into long narrow strips, and into shells by cutting small round pieces; then take the extreme edge between the thumb and first finger of the left hand, and, with a sharp knife or crimping wheel in the right hand, make the ordinary regular circles that are upon cockle-shells, etc. Bake in a moderate oven.

Coffee Biscuits.

Flour $1\frac{1}{4}$ lb., 2 ozs. butter, 2 ozs. sugar, 2 eggs, and a full gill of milk. Rub the butter and flour together. Make a "bay"; put in eggs, milk, and sugar; mix all together, and thoroughly knead upon a biscuit-brake or machine. Failing either of these, beat it upon the table with a rolling-pin, fold it up and beat it out several times, until the "face," or outer surface of the dough, is quite smooth. Put it away, covered with a cloth for an hour, to allow the various ingredients to become thoroughly amal-

gamated. When the dough is nice and mellow, roll it out into a sheet, or if it is too large to roll conveniently, cut it into two or more parts, roll these out very thin, and then cut them out with the coffee biscuit-cutter, dock, put them upon tins that have been dusted very slightly with ground rice (but not buttered); bake them in a hot oven which will draw or curl them up, cover the top with small brown blisters, and give them a good appearance. If the stock of biscuit tools does not include a coffee biscuit-cutter, when the sheet is rolled thin enough cut it with a sharp knife into strips an inch wide, and about three inches long, and with a fork prick each biscuit about six times quite through, and bake as directed.

Victoria or Swiss Biscuits.

Flour 3 lbs., 2 ozs. sugar, 2 ozs. butter, 10 eggs, 2 table-spoonfuls of milk; prepare the same as for coffee biscuits, but softer; roll very thin, cut out with a round cutter, dock or prick them, and bake in a hot oven. These biscuits are delicious with coffee, and are suitable for invalids, being very digestible and nutritious.

Bath Oliver Biscuits.

Milk 1 quart, 1 lb. butter, 2 ozs. yeast, 1 oz. sugar, 6 lbs. fine flour. Make the milk warm; add sugar, yeast, and a handful of flour; mix together, and allow to ferment for an hour or more. Rub the butter into the remaining flour, and make into a smooth dough; let this stand two hours, and then roll it *very thin* in a biscuit-machine or with a rolling-pin. Cut the biscuits out with a cutter as large as a tea-cup, dock them well through with a pricker, place them upon flat baking-tins previously sprinkled with water, and wash them over with milk, with an egg-yolk or two mixed in it. When the tins are filled, put them in a cupboard or drawer for half an hour, and then bake in a cool oven. It is of importance to observe that these biscuits must be cut out very thin; the holes made in them by the pricker must be open and quite through the biscuit, to allow the gas and steam to escape, or they will bulge in the middle and be disfigured. They must be well brushed, when being washed over with milk, to give them a smooth, bright surface.

Nursery Biscuits.

Milk 1 pint, 1 pint water, 2 ozs. yeast, 3 eggs, ½ lb. sugar, 6 lbs. flour. Heat the milk and water to 90° Fahr.; add yeast, sugar, eggs, and about ½ lb. flour, mix together, and put away to ferment for two hours. By that time the yeast, having

exhausted the food given to it in the ferment, will cease to work, and will, so to speak, be ready for more food. Therefore rub butter into the remainder of the flour, add it to the ferment, make into a light, spongy dough, and put it away to allow the yeast to grow and give off carbonic acid gas, which, being confined in the dough, by the glutinous nature of the mass, will make the dough very light. When it has reached that stage, break it into four or six pieces, mould them, and with a rolling-pin roll into a sheet about half an inch thick; cut out with a plain cutter an inch and a half in diameter, place upon baking-tins a quarter of an inch apart, and put into a proving cupboard, or some warm, moist place out of the draught, to prove and rise. When well risen, bake the biscuits in a good sound oven, after which put them in a screen, drying-oven, or some warm dry place for several hours, to evaporate the moisture, and make them light and easily digestible.

Thin Arrowroots.

14 lbs. soft whites flour, 2½ lbs. sugar, 2 lbs. margarine, ½ lb. arrowroot dissolved, 1 oz. soda, 1 oz. cream of tartar, 2 quarts milk, ½ pint eggs. Mix and brake as usual for hard biscuits; roll thin, and bake in sharp oven.

Ginger Stomachic Biscuits.

1 lb. castor-sugar, 6 ozs. butter, 1½ lb. flour, 2 ozs. ground, ginger, ¼ oz. sal volatile powdered fine, 2 eggs, gill of milk. Rub the butter with flour, make a "bay," add eggs, milk, ginger, volatile, and sugar, draw in the flour, make into a smooth dough, roll with a rolling pin, cut out into biscuits about ¼ inch thick, put upon a tin, and bake in a sound oven.

Cracknells.

4½ lbs. flour, ½ lb. sugar, ¼ lb. butter, 12 eggs, half-pint milk, piece of vol size of pea, rub the butter in the flour, make a bay, mix the eggs, milk, sugar, and vol in a basin, give them two or three minutes' whisk, pour into the bay, shake up as usual for hard biscuits; the dough should be smooth and spongy; place this upon the break, or under the rollers and well clear it; roll out, to about fifth of an inch thick, dock well, and cut out with cutters, oval, leaf, diamond, or round; lay them out flat as you cut them for a minute or two, and then take each biscuit in the hand and make them into cup shape by holding them in the left hand and pressing the right thumb into them; as you cup them, drop them into boiling water,—it is usual to have a small copper attached to the bakery where these are made, but a saucepan

will answer the purpose; either way see that the water is kept boiling; as the biscuits rise to the top they will be ready to take out; give them just one minute, and then with a wire skimmer take them out, and drop into a pail of cold water, let them remain covered in this water for three or four hours, drain from the water and put on clean greased tins, bake in a hot oven: see that they are well done, but do not perish or burn them.

Granulated Wheat-meal Digestive Biscuits.

2 lbs. of granulated wheat-meal, 1 egg, ½ lb. butter, 2 ozs. of sugar, enough carbonate of soda and cream of tartar, each to cover a sixpenny piece, and ¾ pint of milk. Rub the butter, flour, soda, and acid well together, make a bay, pour in milk, sugar, and eggs; mix well, make a firm, smooth dough, break into two or more pieces for convenient rolling, roll out as thin as possible, cut out, put upon tins, and bake crisp in a sound oven. The dough when mixed should be kept in a cool place for an hour or two to mellow; it will then roll out freely. Flat tins should be used, so as to ensure baking evenly.

Scotch Ginger Cake.

Rub 12 ozs. lard with 4½ lbs. flour, 12 ozs. sugar, 1½ ozs. ginger, 1 oz. mixed spice, and 2 ozs. bicarb soda; make a bay, and put into it 2 lbs. golden syrup, 4 eggs, and 3 tablespoonfuls of milk. Stir these up, then add 12 ozs. sultanas, 12 ozs. of peel (cut large), and 8 ozs. currants. Mix the whole together into an ordinary soft cake batter; weigh off in 1 or 2 lb. sizes into well-greased square tins, and bake in a cool oven. It is an improvement to the appearance to lay three slices of almond on the top when in the tins.

Oat Cake.

Take the required quantity of coarse Scotch oatmeal, rub into it a small piece of butter, and a little salt, make it into a paste with hot water, leave it to absorb the moisture for five minutes, sprinkle the board with oatmeal, roll into a round shape—the size and thickness of a plate—cut into four quarters, bake on tins in sound oven.

Oatmeal will swell very much in water, and if too tight will not bind together, but will crack and break when rolling out, therefore be sure and only make a paste of it at first, and then dry it up with oatmeal as you roll it out.

Note.—All meal goods, oat-cake, etc., require great care in

baking—the surface, being rough and dry, does not attract the heat; therefore, unless the oven is hot, the biscuit "perishes," and becomes flavourless and unpalatable.

Spice Nuts.

1½ lb. flour, enough syrup to make a light dough, ⅛ lb. lard, ¾ lb. moist sugar, ½ oz. ginger, ¼ oz. mixed spice. Rub the lard, sugar, ginger, spice, into the flour; when thoroughly mixed, make a bay in the middle, and pour the syrup in and mix. When mixed, with a rolling-pin roll it out into a sheet, dusting it lightly with ground rice to prevent sticking, cut out to the size and thickness of a penny, place them upon well-greased tins, half an inch apart, wash them over with water, and bake in a cool oven.

Snaps.

7 lbs. flour, 2 ozs. powder (1), 4½ lbs. sugar, 1¾ lb. butter, 6 eggs, 1 oz. ginger, 1 oz. mixed spice, 3½ lbs. golden syrup. Rub all the mixture together, except syrup and eggs, make a bay, whip the eggs one minute, then add with the syrup soft dough, pin out in small pieces about sixth of an inch, cut with snap-cutter, wash with water, bake in a cool oven. It will be necessary when rolling these to use a little rice flour to keep them from sticking.

German Ginger-Bread.

Melt 1 lb. of honey in a saucepan. When it is quite hot mix into it 6 ozs. moist sugar, 1 oz. of powdered cinnamon, 2 ozs. fine cut candied lemon peel, 4 ozs. almonds blanched and chopped, and enough flour to make it into a smooth stiff paste, make this into cakes of any shape or design, but not thicker than about ½ inch. Bake in a cool oven.

Jumbles.

About 4 lbs. syrup, 3 lbs. flour, 3½ lbs. coarse moist sugar, ¾ lb. lard, pinch of spice. Rub the lard, flour, sugar, and spice together, add syrup, and mix lightly; roll out to the thickness of a penny, cut with a cutter the size of a teacup, place them upon a baking-sheet (well greased and sprinkled) an inch apart, wash them over with water, and bake in a cool oven. Jumbles or snaps should be very thin, and nearly transparent; therefore, do not work the dough about more than to sufficiently mix the ingredients, thus leaving the sugar undissolved, so that when subjected to the heat of the oven, it will boil up, and form the blisters, without which jumbles are imperfect.

Ginger-Bread.

¼ lb. margarine, 2 eggs, ¼ lb. chopped peel, ¼ lb. moist sugar, ⅓ oz. powder, syrup or treacle to make firm dough, 2 lb. flour, 1 oz. ginger. Put the butter, ginger, sugar, and the flour together, make a bay or hole in the middle, pour in the syrup, add the peel and almonds and a little spice; knead the whole into a firm dough, weigh into 1 or 2 lb. pieces, make them into squares, press them or mould upon the usual ginger-bread block, or put the squares upon the tin and dock them; place pieces of buttered wood against each side, firmly fastened to keep in position, bake in a cool oven, and when baked, wash over with white of egg, which will give a bright gloss.

This is a new recipe and is given to fill the place of ordinary gingerbread, as that contains a large percentage of alum, the use of which is destructive to health and in defiance of law.

Common "Seedy's."

3½ lbs. flour, 6 ozs. sugar, ½ lb. butter, 1 oz. of caraway seeds, 1 oz. powdered vol., about a third of a pint of milk. Rub the butter with the flour, put the caraways and sugar in the middle of a bay made in the flour, dissolve the vol. in the milk, and mix the whole into a smooth dough; don't work it about and make it tough; cut out ¼ inch thick with round cutters, place on greased baking-tins, and bake in a very hot oven.

Note.—The oven must be hot to drive off the ammonia.

Dessert Arrowroot Biscuits.

Cream up ½ lb. of butter, ½ lb. sugar, and 5 eggs; add ½ lb. flour and ½ lb. arrowroot, rubbed through a sieve; mix all carefully into a smooth dough, roll and cut out with a small round cutter; if the dough is too soft to roll with a rolling-pin, take it up with a spoon, and drop it upon a buttered tin, and bake in a sharp oven.

Arrowroot Drops.

½ lb sifted arrowroot, 2 ozs. butter, ¼ lb. sugar, 1 large beaten egg, 2 ozs. finely chopped peel (lemon), tablespoonful of milk; place these ingredients in a buttered saucepan, and boil them slowly, stirring briskly all the time until they appear light; then with a small spoon or savoy bag put pieces about the size of a walnut upon a buttered tin, and bake in good oven.

Cocoanut Drops.

1 lb. ground or grated cocoanut, 1½ lb. castor sugar, and 10 whites of eggs; whip the whites as for *meringues* into a firm

snow, then stir in the cocoanut and the sugar together; when mixed, drop them from the savoy bag as for macaroons upon wafer paper, and bake in a cool oven.

Dessert Biscuits.

½ lb. butter, ¼ lb. sugar, 1 lb. flour, 8 yolks of eggs; cream the butter, sugar, and yolks as for cakes; flavour with essence of vanilla or ratafia; then mix in the flour, and drop them in buttons from the savoy bag half an inch apart upon a buttered tin, and bake in sound oven.

Lemon Biscuits.

Rub the rind of a lemon upon ¼ lb. loaf sugar, then crush it to powder; rub 3 ozs. fresh butter into ½ lb. flour; make into a "bay." Put in the sugar and 3 well-beaten eggs; mix this into a smooth paste, roll out thin with the rolling-pin, cut out with a plain cutter, and bake in a moderate oven upon slightly buttered tins.

Queen's Drops.

½ lb. butter, ½ lb. sugar, ½ lb. eggs. ½ lb. flour, 2 ozs. currants, piece of volatile as big as a pea; cream the butter, sugar, and eggs as for cakes; powder and beat the volatile up with it; mix in flour and currants, but do not work it about much to make it tough; when mixed, put the mixture into the savoy bag, and drop in buttons about the size of a halfpenny upon paper laid on baking-tins, and bake in a hot oven.

Rice Biscuits.

¾ lb. flour, ¼ lb. ground rice, ¼ lb. butter, 6 ozs. sugar, 2 eggs, a piece of volatile the size of a pea, dissolved in enough milk to make the whole into a nice smooth dough or paste. Rub the butter, rice, and flour together, make a "bay," put in sugar, milk, and egg; mix these latter ingredients a little, and then mix the whole together; roll out with a rolling-pin, cut out with a plain cutter, the size and thickness of a penny, place upon tins, and bake in a hot oven.

Pavilion Biscuits.

2¼ lbs. flour, 1¼ lb. sugar, ¾ lb. butter, 3 eggs, a little milk, with a small piece of volatile in it. Mix as for rice-biscuits, roll and cut out with a fluted cutter; wash them over thickly with yolk of egg, turn them upside down upon a mixture of blanched

almonds and loaf sugar chopped small, slightly press them, turn them over, place upon tins, and bake in a hot oven.

Derby Biscuits.

2 lbs. flour, 1 lb. butter, 1½ lb. sugar, 3 eggs, 6 drops essence of lemon, ¼ lb. currants, and enough milk to make it into a smooth dough. Mix same as for rice-biscuits; roll and cut out with a fluted cutter, and bake in a hot oven. This dough will form a good basis for several sorts and shapes, etc. When mixed, divide it into three or more parts, flavour with cinnamon, lemon, vanilla, and some with currants, cut each sort out with different shaped cutters, ornament some with neatly cut pieces of angelica, and some with "hundreds and thousands," those minute sweets of our childhood's days.

Lemon Drops.

1¼ lb. flour, ½ lb. butter, 1 lb. 2 ozs. sugar, 2 eggs, 6 drops essence of lemon, piece of volatile as big as a bean dissolved in about 4 table-spoonfuls of milk, or enough to make a smooth dough. Mix as for rice-biscuits, etc. When mixed, take a piece of the dough, lay it upon the board, fold it over, and roll it with the hand backwards and forwards upon the board until about the thickness of a man's thumb, then cut it into pieces about half an inch, place them upon tins upon the cut part, wash over with milk, and bake in a cool oven.

Shrewsbury Biscuits.

2 lbs. flour, 1¼ lb. butter, 1¼ lb. castor sugar, 4 eggs, pinch of powdered cinnamon, gill of milk. Rub the butter and flour together, add sugar, eggs, cinnamon, and milk; make into a smooth dough, roll thin, cut out with a fluted cutter, bake on tins in a sharp oven.

Small Napoleons.

1 lb. butter, 1 lb. sugar, 1 lb. eggs, 2½ lbs. flour, ½ lb. currants, ½ pint milk, 2 ozs. chopped almonds, 1 oz. baking-powder, cream up as for cake; put a spoonful into long oval tins (small), chopped almonds on top, bake in quick oven.

Rich Cocoanut Biscuits.

1 lb. desiccated cocoanut, 1 lb. sugar, 2 ozs. flour. Make into soft paste with white of egg; don't work much; run from savoy bag upon wafer paper; mix with wooden spoons; bake in a cool oven.

DESSERT CREAMS.

NOTE.—Double Cream—*i.e.*, very thick cream—should always be used for whipped creams; but do not whip them too much, or they will be liable to curdle or become butter. It will be firm enough as soon as it stands in the position or shape you place it in. If for a large cream, more isinglass or gelatine in proportion must be used; small ones, of course, have much less weight to carry. In adding wines or acids, reserve them till just before filling; they are liable to curdle the cream.

Strawberry Cream.

Pick the stalks from 1 lb. strawberries, mash them with ¼ lb. fine sugar, rub them through a hair sieve with a wooden spoon, dissolve 2 ozs. gelatine in ¼ pint warm milk; let this cool a little; whip 1 pint of thick cream, and stir it with the pulp and the gelatine solution; if not dark enough, add few drops of cochineal, but do not waste much time over this part, the acid from the fruit is liable to turn the cream, and the gelatine is set before you have moulded the cream; as soon as mixed put into mould or moulds, put on ice to get firm for an hour or so. Raspberry and red currant prepare in the same way. If fruit is not obtainable, use 1 lb. of jam, little or no sugar.

Italian Cream.

Dissolve 1 oz. isinglass in a table-spoonful of hot milk, make a custard with ½ pint milk, 3 yolks of eggs, 2 ozs. of sugar, stir in 4 drops essence of vanilla, ¼ glass of brandy, allow to cool a little, stir in isinglass and a well-whisked ½ pint thick cream; put in oiled mould and set on ice.

French Cream.

Dissolve 1 oz. gelatine or isinglass in a table-spoonful of hot milk, add ¼ lb. sugar, ¼ lb. apricot pulp, teaspoonful of lemon juice, and lastly 1½ pint cream; mix carefully, mould, put away to set as before. When different colours are required in moulding, put them in, and let each set firm separately before adding the next.

Blancmange.

Dissolve in 1 quart of warm milk 2 ozs. gelatine or isinglass, flavour with the rind of lemon and cinnamon stick, boil up for a few minutes, strain or take out the peel and cinnamon, stir in

a little brandy, a half pint of cream, and pour into moulds and allow to set in a cool place. Other flavourings—rose, vanilla, orange, etc.—may be substituted for the lemon and cinnamon. 1 or 2 ozs. of corn may be boiled with milk if preferred, firm and thick.

Lemon Cream.

Soak 1 oz. of gelatine in a little milk as before directed; then put into a stewpan with ½ pint more milk and the rind of five lemons; boil for about five minutes, then strain, add 1 pint cream and ½ lb. of powdered sugar, the juice of 2 lemons, and the yolk of an egg well beaten, and a little egg yellow, to give it a lemon colour. Whisk all well till spongy, then put into the mould. Let flavours be delicate, but pronounced, not insipid.

ICES.

The demand for ices is increasing every year; from being a luxury, seen only upon the tables of the rich, they have now become a necessity among all classes of society; and bakers, etc., who wish to occupy their time profitably, will do well to consider the ways and means of making ice-creams. The process is not elaborate, nor are the utensils expensive, and with the recipes here given the most inexperienced should be able to make them fairly successful. The utensils should consist of one or more freezers, a tub or tubs to contain them, and a spatula to work the ice from the sides into a smooth mass; these can be purchased now in the form of a machine which contains them all, and is simple and cheap. If you purpose essaying to try your hand send for price lists to firms supplying such goods A few general notes or hints will be useful to consider before quantities are given. First, if you can purchase and use a saccharometer do so. When making up ices from the juices or pulp of fruits, it is extremely difficult to secure perfect uniformity, and maintain an unvarying standard without it. When using the thermometer, from 19 to 21 degrees of strength of the fruit syrup will be found the best, and used in conjunction with clarified sugar (see "Clarified Sugar") there should not be much fluctuation; without it the palate must be your guide. Make them nice; but if too rich in sugar and fruit they will not freeze well; if too poor, they will resemble frozen snow and be tasteless. It will be necessary in nearly every case to use essences to perfect the colour or flavour; use sparingly, coarse flavourings offend refined palates and vulgar colours the eye. Be careful that the salt you use in freezing does not by any chance touch the cream: it will spoil it entirely. When turning the freezer, if the rough ice around it is melting and sloppy, draw off the water and re-pack. When you turn out ice-puddings, etc.,

from moulds, carefully wipe all the salt and moisture from the outside before taking off the covers. To preserve the rough block ice not in use, bury in sawdust and cover with paper and flannel. To cut up for use, use an ice-piercer (a long stout needle fixed in a handle); dig this once or twice in the part you want to break, and the piece will break off without waste. To pack the tub for freezing use three parts of crushed or small pieces of ice and one part coarse freezing salt—ordinary salt will do if it is inconvenient to obtain others.

Strawberry Water Ice.

To 1 quart of water, add the pulp from ¾ lb. strawberries, or ¾ lb. strawberry jam; the juice of 2 lemons, and clarified syrup to taste. If not strong enough of strawberry flavouring, use a drop or two of strawberry essence, also deepen colour with a few drops of cochineal. Strain through a sieve and freeze. Don't forget the note about richness; whatever taste or flavour it has before going into the freezer, it will have when frozen. When ready, place in the freezer; put the lid on, pack it well round, and give it a few minutes' brisk turning; take off the lid if it is a hand freezer, and use the spatula to scrape it down from the sides; with the lid off, give it another few minutes' brisk turning, by taking hold of the top with thumb and fingers of one hand and giving it a sharp twist round. As the ice forms inside, work it down with the spatula until the whole is a smooth firm mass; cover up, and it will be ready for use. During the time of portioning it out to buyers, give it an occasional work down with the spatula.

Lemon Water.

Rub the rind of 2 lemons on sugar, dissolve them in ½ pint of water; add 1 pint syrup, the juice of 1 orange, the juice of 6 lemons; mix, strain, and freeze as before *directed.* Currants, cherries, gooseberries, and other fruits may be prepared in the same way, by mashing, if soft, in cold water, or pulping them by boiling thereafter, straining and flavouring. If any fruit ice should not be acid enough, use a little lemon juice or a pinch of citric acid. A couple of whisked whites of eggs, or 1 oz. dissolved gelatine whisked, and added to water ices when freezing, is said by some to give it more body.

To Clarify Sugar for Simple Syrup.

Add to 3½ lbs. sugar, 2 pints water, mix together, dissolve, and boil gently for 5 or 6 minutes, skim off the dross or scum as it rises, and when cold keep in a bottle for use as required.

Cream Ices.

Neapolitan ices are made by preparing different kinds of ices and moulding them together. Boil ¼ lb. good rice in 1 pint milk until quite soft, add 1 pint cream and stick of vanilla; boil one minute and let cool; then drain off the thin part, put 8 yolks with it, stir with a wooden spoon over the fire until it thickens, it must not boil, let it cool, and then add 1 pint double whipped cream; mix, and put one-third of this with the rice that was left in the pot; take out the vanilla and freeze this as usual. When nicely frozen and smooth, put this into Neapolitan moulds; these are very small moulds that open at the side; place these in the ice pail, packed up with ice until required; then dish them up with the remainder of the cream that was left.

Neapolitan (2).

Yolks of 8 eggs, small glass cold water, gill of maraschino (liqueur); mix these together, and add syrup sufficient to make it sweet—a nice piquant sweetness that you like to taste twice. Place this in stewpan on the fire, and whisk it until it comes to a thick cream-like appearance; *don't let it boil*; take it off the fire, give it five minutes' brisk whipping with the whisk; when very light put it into the freezer, cover with a cloth, let it cool, then stand the freezer in ice for three or four hours till wanted. When frozen some of this can be mixed with other ice, take it carefully out of the middle, and put in the place you have taken it from an ice of different flavour and colour.

Neapolitan (3).

1 pint cream, 3 eggs, ¼ lb. sugar, 6 drops essence of vanilla; break the yolks up slightly, put the sugar in, beat them a little till smooth, whisk the whites separately to a froth, then add them to the yolk and sugar; now mix this with the cream and flavouring, whisk, place altogether in the pan and simmer as before; when ready rub through hair sieve, allow to cool, then freeze it in the usual manner by taking the chilled cream, put in a freezer, cover, put the freezer in the freezing tub, well pack round with 1 part salt, 3 parts ice, occasionally sprinkle a handful of salt on the ice while freezing, give a few turns and work it down smooth with the spattle; then turn until the cream is frozen even and smooth all through. If the ice is sloppy, draw some water off, re-pack with fresh ice and salt, cover up well; then put a blanket or cloth that has been wetted with the salt ice water you have drawn off, all round it, and leave about two hours to perfect. If to be sold in moulds, and of different colours, lay layer upon layer, fill them quite full, pressing the cream into all

the corners, fasten the cover on firmly, cover the mould with paper, and bury in the usual mixture of ice and salt. This must stand an hour or two; when required, take the mould out of the ice, wipe or wash off the brine by quickly dipping in cold water, wipe it dry, lift off the cover, take out the pins if it is in parts, and in a minute or two it will be easy to slip it out on its dish.

Ice Pudding.

Make a rich custard with 1 pint milk, yolks of 6 eggs, 3 ozs. sugar, 6 drops vanilla; when the custard is ready, add 1 pint cream and gill of maraschino, freeze in the usual way; have ready the moulds, and some dried fruits, some sponge cake moistened in cream or milk, put a layer of the frozen custard in first, and then alternate layers of slices of sponge cake, custard, and fruit until *quite* full; put the cover on, embed in ice, and pack, wipe, and turn out as before directed. An assortment of small dried fruits, mixed into the frozen custard, and moulded, make a nice pudding without the sponge cake, being much easier to make.

Coffee Ice Cream.

Flavour a pint of boiling milk with good essence of coffee, or (if preferred) some strong, freshly-made coffee, ½ lb. sugar, 6 yolks of eggs, simmer gently as for custard; when it thickens, add 1 pint of good cream, stir for one minute over the fire, and when cool freeze in the usual way.

Chocolate Cream.

Dissolve ½ lb. of best chocolate in ½ pint boiling milk, add 1½ pint cream and ½ lb. sugar; boil until the sugar is melted; strain through hair-sieve; when cold, freeze in the usual way. If to be moulded, while freezing work until smooth, put it in the mould, keep in ice until wanted, turn out as directed.

Note.—All cooked creams or custards for ices must be quite cold, before being frozen; they are apt to curdle, besides losing flavour, if put in warm.

Vanilla Ice Cream, Cheap Shop Sale.

Well whisk 8 eggs, put them with 3 pints milk, 1 pint cream, 8 drops vanilla, 14 ozs. sugar, 2 ozs. of quite fresh butter; mix together in the boiling pan, and bring to boiling point in the usual way; keep the custard well stirred from the bottom, and when it is thick, strain it through sieve into freezer, let it cool, freeze as directed.

Note.—These are a few examples that cover nearly the whole of the principles that govern ice-making. You will gather from them all that is necessary for ordinary occasions. First, observe that eggs, and creams or milk, have to be made into a custard by cooking; and that the difference between a plain and a rich ice lies chiefly in the ingredients and not in the preparation; less or more eggs, milk instead of cream, with added cornstarch and gelatine to give body, will make all the difference; raspberry and strawberry flavouring substituted for fruit, and a pinch of citric acid in lieu of lemons, cheapen a mixture very much. By having in remembrance the note at the beginning of this article about the working of poor and rich mixtures, you will be fairly safe. There is a very good thing in this line that is quite new that I must find space for. When travelling through the United States of America I came across, especially in the cities of New York and Columbus, a kind of frozen meringue mixture, the recipe for which is very simple: Whip some cream stiffly, flavour, colour and sweeten, with any sort of essence, cordial, or liquor. This is put into small fancy tankards (heaped up), and then put into the refrigerator (or freezing cupboard) to freeze without any further working. In some cases this was blended with one-third of whites of eggs whisked to a snow.

BOILED SUGAR GOODS.

THE BAKERS' GUIDE finds its way into many places where it may not be convenient to purchase such articles. To meet such cases the annexed recipes are given. The instructions are of the briefest kind, and will serve only for a foundation or for practice. The most minute description of the various degrees given by sugar boilers as separating or defining the different stages through which boiled sugar passes would avail little. You must by patient observation and experience (with sugar as with flour, etc.) work out from within yourself the required knowledge, by touch, sight, smell, taste and instinct.

The Degrees in Sugar Boiling.

Having made up a good fire, with either coke or charcoal, and allowed it to burn fairly clear, put into the preserving-pan as much refined sugar as you need for the work in hand, allow not quite half a pint of water for every pound of sugar, and a pinch of cream of tartar, place this on the fire, stir all together. If the fire is very hot, pull it a little to one side, do not let it boil until the sugar is dissolved, then let it boil rapidly; carefully skim all the dross or scum off that rises to the top; let it boil,

dip your finger in cold water, and quickly nip a little sugar out; press finger and thumb together, and open them again quickly—if the sugar forms thin threads that is the first degree, called candy; boil this candied sugar (this is suitable for candies) a minute or two longer, until the sugar taken in the skimmer and blown forms into bubbles or bladders—that is called the blown degree; boil this (blown sugar) another minute, try again—if when you jerk the skimmer from you the sugar flies off in flakes, it has then attained what is called the third degree or feather; boil the sugar still another minute, just time enough for you to draw some cold water; put a stick in the sugar, and then put it quickly into the cold water—if it becomes quite hard directly, it is then the fourth degree or crack (this is suitable for making barley sugar); but when for barley sugar throw in pinch of citric acid or juice of a lemon, and be sure the water is perfectly cold when you put the sugared stick into it. To arrive at the last stage called the caramel degree, boil the sugar a little longer; put a little into cold water, and if it cracks like glass it is then the required degree. These are the rule of thumb tests. If you get a thermometer and ascertain the degree to boil to for the goods you are making there is no reason why you should make better goods in a year with it than in five without it. The candy degree is 230 Fahr. to 250 Fahr.; fondant, 240 Fahr.; crack for drops, 320 Fahr.; caramel, 350 Fahr.

Drops.

Acidulated drops, tablets, coloured or white drops, with nearly any flavouring, may be made from the following: 5 lbs. sugar, ¼ oz. cream of tartar, ½ oz. tartaric acid, pint of water, and what flavouring essence and colour you may require; boil up sugar and water as directed, dissolve the cream of tartar in a table-spoonful of water, throw into pan, and boil to "crack" 320 Fahr.; pour upon a well-oiled slab, let it cool sufficiently to work in the colouring, flavouring whatever you have ready, and the tartaric acid (don't overdo the colour and flavour); and when getting firm enough, put in pieces through the drop-machine (these are not dear); dust with fine white sugar, and pack in air-tight tins.

Boston Butter Scotch.

3 lbs. sugar, pint of water, ¼ oz. cream of tartar; boil as the preceding, to crack; add ½ lb. good sweet butter and a tea-spoonful essence of raspberry; as soon as mixed in pour into moulds; when cold, wrap up in the usual way in waxed paper, tinfoil, etc.

Barley Sugar.

Boil and clarify, as directed, as much sugar as you require, say 4 lbs., a pint of water, ½ oz. cream of tartar, teaspoonful essence of lemon; when commencing to boil, mix the cream of tartar in a table-spoonful of water, and put in pan; boil up to crack, mix in flavouring, turn out on a well-oiled slab, let it cool sufficiently to take in hands; cut in strips (use the scissors) 6 inches long, ½ inch wide; take each end between thumb and finger, and twist in opposite directions; stand upright in air-tight tins. A nice *palace sweet* is made by dipping cut slices of candied peel in this boiling.

Horehound Candy.

Make 1 pint of strong decoction of horehound by pouring scalding water on; and then, boiling up two minutes, strain, and put this with 2 lbs. sugar into the pan; boil as before directed for candy (250 Fahr).

Black Currant Lozenges.

Mix ½ lb. sugar with ⅓ pint of juice, dissolve 1 oz. gelatine; just simmer the whole in a pan for twenty minutes; pour in thin layers in tins about ¼ inch thick; when nearly cold, stamp out small oval or round shapes; slightly dust with fine sugar, and pack in boxes.

Cough Lozenges.

Dissolve 1 lb. liquorice in a pint of water, ½ teaspoonful tartaric acid, teaspoonful oil of anise-seed, teaspoonful powdered ipecacuanha; make the liquorice and water into a thick gum with powdered gum-arabic, and then mix the whole into a stiff paste with fine sugar; work this up, cut out, dry, and pack.

Good Cough Drops.

Make a strong decoction of horehound, about 2 ozs. herb to ½ pint of water; when boiled five or ten minutes, strain, make into 1 pint with water; add 7 lbs. sugar, ½ oz. cream of tartar as for other boilings; keep stirring while boiling up to crack (320 degrees), let it cool quickly, work into it on the oiled slab table-spoonful of oil anise-seed, 12 drops oil of peppermint, 1½ oz. tartaric acid; cut out as for drop goods.

Prize Butterscotch.

1 lb. fresh butter, 1 lb. sugar; ¼ pint cream; boil to hard ball (250° F).; be careful; it will burn quickly.

BUNS, SCONES, Etc.

Helensburgh Scones.

FINE white flour, 4 lbs.; 1 lb. good butter, ½ lb. sugar, 1 pinch salt, 1 quart sour milk, ¼ lb. powder; rub all together thoroughly, make a bay, pour the milk in, rub it up well and quickly, weigh into pieces of 14 ozs. each, roll them out about 6 inches in diameter, dock, break each piece into four, roll them round, slightly flatten, and bake on an iron bottom; when partially baked, turn them over and finish in a sharp oven.

Scotch Soda Scones.

2 lbs. flour, ½ lb. butter or lard, a teaspoonful of salt, 1½ oz. powder, 1 pint of milk or butter-milk; rub the butter and flour together; make a "bay," pour in milk, add salt, mix lightly and quickly, divide into four pieces, mould into round balls, and roll with rolling-pin to the size of a small plate; dock them with a "docker," cut into quarters, place together again, wash over with yolk, and bake in hot oven.

Brown and whole-meal scones are made in the same way, and are usually very much liked.

All plain soda goods should be baked in a good hot oven.

Cream Scones.

2 lbs. fine flour, ¼ lb. sugar, pint milk (if sour or curdled, it will rather improve the lightness), ¼ lb. salt butter, and 2 ozs. of powder: mix the butter, flour, and the powder together, and rub fine; make a "bay," put the milk in and mix quickly and lightly into a dough; break this in eight parts, mould them, and roll out about the size of smallest plate; wash over with yolk of egg, place upon a buttered tin, and put them into a hot oven; when they are just beginning to brown, take them out, and with a thin flat knife turn them over quickly, and then back into the oven until baked. Do not allow them to be done before turning them, as that will spoil the "finish," but about half done, and then turn them over to finish baking.

Scones, London Fermented.

1 pint milk, 1 pint water, made warm; add 1 oz. yeast, 3 ozs. sugar, and 2 handfuls of flour; put away to ferment; when ready rub ¾ lb. butter, 1 oz. powder, teaspoonful of salt into enough fine flour to make a free soft dough (it will take 4 lbs. altogether),

weigh into 14 oz. pieces, roll out and cut in quarters as before, place upon baking-tins, and put in the proving cupboard to prove until quite light, then bake in a good sound oven. All scones should be washed over with egg and milk before baked.

Buns.

1 pint milk, 1 pint water, 1 lb. sugar, ½ lb. butter, 2 eggs, 4½ lbs. flour, ½ lb. currants, ¼ lb. peel chopped fine, ½ lb. sultanas, 3 ozs. dried yeast, 4 drops of spice; make the milk and water warm (90 degs.), dissolve into it ½ lb. of the sugar, yeast, eggs, and ½ lb. of the flour; mix together, and set to ferment in a warm place (not hot) for about 2 hours; when it settles down it is ready. Having rubbed the butter with the rest of the flour, make into a light dough, adding fruit, peel, the other ½ lb. sugar, etc.; put this to prove, covered from the air, for another hour—it will then be ready for moulding. Break into pieces, 2 to 3 ozs. each, which should be moulded round, and placed upon tins an inch apart; then put to rise in a moist, warm place, until light enough for baking, which will be in about half an hour; bake in a warm oven; when baked, wash over with milk sweetened, and an egg in it—this will give them a glossy appearance.

Rusks.

3 eggs, 1 pint milk, 1 pint water, 1 lb. sugar, ¾ lb. butter, 3 ozs. dried yeast, and about 4½ to 5 lbs. flour; ferment the same as for buns. When the dough is ready, weigh into pieces of 1 lb. each, fold them into squares, and let them prove 5 minutes; then carefully fold and roll them into long rolls of about twelve inches, put them upon tins to prove, and when well risen bake thoroughly, but not too brown; and on the morrow cut them into thin slices with a sharp knife, lay upon tins, and put them into a hot oven; when brown or toasted, turn them over. For Dutch rusks roll 1 oz. pieces round like buns; prove and bake; when cold, cut in half through top and bottom, and toast in good heat.

Bath Buns.

Set a ferment with ½ pint milk, ½ pint water (at 90°), 2 ozs. sugar, 2 ozs. yeast, 2 ozs. flour; when subsiding, rub 3 ozs. butter into 2 lbs. flour, essence of lemon, and make dough; put this to prove in a warm place for an hour; then chop into it roughly and not too much, 3 egg yolks, ½ lb. rough pieces lump sugar, 2 ozs. fine peel, 2 ozs. sultanas, and at once put them on baking sheets with a fork in rough pieces of 2 ozs. each; prove slightly, lay 3 comfits on top, dredge with sugar, and bake.

Good Friday Crossed Buns.

The practice of eating hot cross buns on Good Friday has become a national custom, from which there are very few abstainers. These buns are in universal request, and welcomed alike in palace and cottage. The antipathy of a certain section of the Christian community to crosses in general has not stopped short of the cross upon the Good Friday bun, which, if eaten at all, is eaten minus the cross. This slight defection, however, of a small proportion of the host of consumers is more than compensated for by the tenacity with which the rising generation "cling to the cross," not so much, perhaps, from any particular religiousness on their part, as from the fact that the cross upon the outside generally means more plums inside; and further, if there were no cross it is very probable there would be no bun.

There is no fixed formula for making hot cross buns, and hence the recipes differ according to the town or district where they are produced; but the following is the recognised mode among London bakers, differing only in richness of material and quality of workmanship. I would remind bakers, and those who cater for the public, that of late years there has been a loud protest from the upper classes of society against the too lavish use of spice. This has not been without reason, for some of the buns to be seen in shop windows look as though they had been freely impregnated with black pepper. In the following recipe I have given essence of spice, as I consider it much the best; but if it is not convenient to obtain this, a *very little* of the best mixed spice will suffice.

A 5-quart mixture will make about 25 dozen penny buns, 1 dozen out of 2 lbs. 2 ozs., and, as this is a convenient-sized batch for small bakers employing only two or three men, I will give the ingredients for this quantity, which, of course, can be doubled or divided to suit the worker; and if I supplement this by saying that 85 quarts will make about 5,000 penny buns at the above weight, and that the same proportions and directions should be observed, this will afford scope for any quantity

Recipe for Crossed Buns.

2 quarts of water, 3 quarts of milk, 6 eggs, 6 lbs. of fruit (sultanas, currants, and finely chopped mixed peel), 3 lbs. of butter, 4½ lbs. of sugar, 12 drops W. J. Bush & Co.'s oil of bun spice (not more), ¾ lb. of French yeast, and about 20 lbs. of fine flour. Put away a ferment prepared as follows: Heat the milk

and water to 90°, crack the eggs into it, add half of the sugar, yeast and about ½ lb. of flour; mix this carefully, and cover up the pan in a warm place; this will take about three hours. When it is ready, add the spice, rub the butter into the flour, add the fruit and the rest of the sugar, and make the whole into a weak dough; cover this up for an hour; it should then be "full proof"; if not, leave it a little longer, for it is important that there should be plenty of gas to raise so rich a mixture. When it is well risen weigh off in 2 lbs. 2 oz. pieces, "hand" these up nice and dry in flour, and cover them up from the air, have the tins ready, well cleaned, buttered, and warmed, break twelve out of each of these pieces, mould, tin them about an inch apart, and put them away in a warm moist place with plenty of steam (usually a proving cupboard, or the trough where the bread dough is made); let them stand until about half-proved, then cross them. The crosses should be cut in deeply, because if too superficial, when the bun is more risen, the cross will be obliterated. When they are crossed, put them back again to finish proving; when nice and light, bake them in a good sound oven. The oven should be made hot, and then allowed to remain a quarter of an hour before the buns are put into it; if the oven is too hot and rash, it will burn or scorch them; on the other hand, if it is a cold, dead heat, it will destroy both appearance and flavour. When baked, wash the buns over with a wash made with 1 quart of water, 1 tin of condensed milk, and 2 eggs.

Some bakers, when manufacturing large quantities of buns, put away large ferments without flour, sometimes with potatoes, sometimes with a part patent yeast, dipping a quart or two into the ferment when set—thus saving time and being more convenient, and making a large and clear bun. These buns are very rich, consequently should be worked warm and free; therefore no larger quantity should be put in hand than the plant and staff engaged are able to cope with.

PETIT CHOUX PASTE, ECLAIRS, AND CREAM BUNS.

THESE are made from a batter, which, as in the case of Derby wine biscuit, dough and Genoese pastry, may become the basis from which are worked out several very ornamental dishes of light, digestive, and highly delicious buns or cakes. They are very nice with any kind of preserve; whipped, sweetened and flavoured cream; chocolate, custard, sultanas or raisins, and can be flavoured with either essence

of lemon, orange, vanilla, or powdered cinnamon. Prepare as follows: 1 pint water, ½ lb. butter, ¾ lb. flour, 9 eggs. Put the water into a stewpan large enongh to allow for stirring. and let it boil up. Stir in the butter, and if any fruit is required, put it in at this stage, and boil up again. When boiling, add the flour and boil again, keeping it slowly stirred all the time after the flour is in. Stand the stewpan on one side for four or five minutes, then well beat in the eggs one at a time, and it will be ready for baking. Run out of the savoy bag in fingers and round pieces size of half-a-crown upon a baking-sheet, and bake in a good "sound oven" for fancy varieties. When nearly done take some out and sprinkle with powdered loaf sugar, then sprinkle with water, and put them quickly back into the oven until the sugar is melted, and becomes set in bright glossy flakes or bubbles; they will then be ready. When cold, make an incision in the side and put in any kind of preserve or cream; wash them over with egg. Sprinkle them over with finely chopped almonds and loaf sugar, as for pavilion biscuits. Moisten this with some of the egg wash by shaking the brush over them, and bake them slowly a bright golden brown. Or bake them quite plain, and when baked, scoop a small circular hole out of the top of each; fill the hole with whipped cream, sweetened and flavoured; pipe round the outer edge with white and pink icing sugar, and place a small bright glazed fruit on the centre of the cream. Or glaze them with melted chocolate, add it to fondant, work together over the fire for a minute; add 6 drops essence of vanilla. Stand it near the fire, or on the hot plate, to keep it warm, and dip the top into this mixture, and put it into the oven for two minutes to make shine.

Cream Buns.—The same mixture, but add a piece of ammonia as big as a pea, and bake them under tins.

Chelsea Buns.

Ferment, as for ordinary buns, 1 pint milk, ¼ lb. sugar, 2 ozs. yeast, 6 yolks, handful of flour; when ready, rub ¼ lb. butter in about 1½ lb. of flour, 6 drops essence of lemon in ferment, and tablespoonful of weak egg yellow; mix, and make into light dough; give this one hour's proof; roll it out to about ½ inch, put ¼ lb. sugar in dredger, dredge a little on the dough, spread the dough with 6 ozs good butter, fold it up as for puff paste, and roll out twice or three times; roll it up after this (the same as for any jam roll) to 1½ inches in diameter; cut this up in pieces of one inch, and stand them close together, cut sides downwards, on buttered tin; prove, wash over, and dredge with sugar; bake in a steady oven. They are best sugared when half baked.

Cinnamon Biscuits.

Beat 8 eggs with ½ lb. sugar, ¼ oz. of powdered cinnamon; make into a firm paste with about 1 lb. of fine flour; roll out thin; cut out with fancy shaped cutters, and bake on a buttered baking sheet.

Cocoanut Biscuits.

1 lb. sugar, ½ lb. desiccated cocoanut, the whites of 7 eggs; beat the whites to a firm snow as for meringues, add the sugar and cocoanut, make into small round balls, place them upon wafer paper on a flat tin, sift fine sugar over them, and bake in a cool oven.

Dessert Biscuits.

Cream as for cakes, ½ lb. fresh butter, and ½ lb. sugar; 6 yolks of eggs; flavour with any of the essences as desired; then mix in carefully 1 lb. Hungarian flour—it will be then about the consistency of queen's drops; run them out of the savoy bag upon paper as queen's drops, and bake in a sharp oven; if too stiff to flow from the bag, roll with pin, and cut out with fancy-shape cutters.

Ice Wafers.

Well beat 6 eggs, add 1 lb. sugar, 12 drops essence of vanilla, 3 pints milk, ¾ lb. flour, and bake in usual way; make the wafer irons hot, butter them, put the mixture and close the irons; put on fire; turn, when done, on other side.

Cream Slices.

Base:—2 lb. flour, ¾ lb. butter, 1 lb. sugar, 6 eggs, ¼ oz. baking powder, 6 drops essence of lemon; rub butter and sugar together, and mix the whole into a short, dry dough; roll ⅛ inch thick, cut into strips of 3 inches wide, and bake in good heat—not hard. Then prepare a meringue, by whipping to a stiff snow 18 whites of eggs; add while whipping, a sprinkle at a time, 2 lbs. sugar; when stiff, take the baked strips of sweet paste, spread them with preserve, and then lay on them the meringue, and with a knife scoop it up each side to a point; let it be 2 inches thick in the middle, starting from nothing at the sides. Sprinkle with cocoanut (cut fine), dust with castor sugar, and put into oven to brown a minute or two; when brown, cut in 1 inch slices with a knife dipped in water.

Chocolate Dessert Biscuits.

½ lb. sugar, 6 ozs. ground almonds, 2 ozs. melted chocolate, 2 ozs. flour; mix to a firm dough with whites of eggs, cut out

with 1½ inch cutter, dust well with icing sugar, and bake in cool oven.

Crescent Dessert Biscuits.

¾ lb. flour, 6 ozs. sugar, ½ lb. butter, 4 yolks, the grated rind of lemon, ammonia size of pea; rub sugar, butter, and flour together, add other ingredients, mix into smooth dough, roll ⅛ inch; cut out with 2 inch cutter, then with 1 inch cutter cut out one side, leaving form of crescent. Make a thin paste with icing sugar and whites of eggs, lay it on with brush, and bake in cool oven. Colour some of the icing pink.

Aniseed Biscuits.

1½ lb. sugar, 1¼ lb. flour, 12 eggs, 2 ozs. aniseed, ¼ oz. ammonia; whip up as for sponge cake, mix in flour, and drop about size of half-crown on nicely prepared waxed, floured tins; dust with sugar before baking.

Russian Paste.

2 lbs. flour, 2 lbs. sugar, 2 lbs. eggs, 3 lbs. flour, 1 oz. powder; cream butter and sugar and eggs as for cakes, and add flour and powder, mix in; take off one-third and stir into it 2 ozs. melted chocolate, one-third colour pink, and then put each colour alternate and roughly one upon the other in veins, and bake. When cold cut in fingers, glaze top with apricot preserve, and the extreme end of top in fine cut cocoanut.

Raspberry Buns.

¾ lb. sugar, ½ lb. butter, 4 lbs. flour rubbed fine; add 4 eggs, ½ oz. powder, and enough milk to make soft dough; roll round pieces about 2 ozs. each, put a spot of raspberry jam on top, pinch the dough up round it to enclose it, wash over top, dip in castor sugar, and bake in good heat.

Lemon Honey Cheese Curd.

1.—Put into a stewpan on a slow fire 1 lb. sweet butter, 2¼ lb. sugar, 30 eggs, juice of 6 lemons, the zest rubbed off rind of 3, and put over gas or fire until quite thick; do not burn.

2.—9 yolks, 1 lb. sugar, 6 ozs. butter, juice of 4 lemons, 1 zest; proceed same. It will burn quickly, and must be on a very slow fire.

Halfpenny Rice Cakes.

1 lb. margarine, 1½ lb. sugar, 5 lbs. flour, 6 eggs, 1½ pints milk, 5 ozs. powder; rub the butter, sugar, powder and flour up fine,

add eggs and milk, mix quickly; mould in little balls, wash over with milk; dip tops in either cocoanut or granulated sugar, and bake in good heat.

Almond Dessert Biscuits (Parisian Biscuits).

2½ lbs. sugar, 1 lb. ground almonds, 3 ozs. flour, and whites of eggs to make it into a dough stiffer than macaroons—just stiff enough to force through a star tube on to wafer paper, and keep its shape; make a variety of shapes. Melt some chocolate, and mix with a little of the mixture; put this through a smaller tube, on to rings, etc., from larger tube (about ½ inch, squeezed out), and ornament these chocolate dots with pieces of dried cherries, etc. Force three pieces together to resemble a cluster of filberts, and ornament with cut almonds. When the mixture is all run out, put the tins aside for a few hours to dry, and then slowly bake in cool oven.

TO MAKE FONDANT.

FOR glacé work, etc., 7 lbs. sugar (the best loaf or Dutch crushed, 2½ lbs. water, ¼ oz. cream of tartar, or 1 lb. glucose (liquid glucose is more reliable than the dry solid). Glucose is not crystallizable, and therefore its use is two-fold—by preventing the too rapid crystallization of the boiling sugar, and giving more gloss to the glacéd goods. The use of cream of tartar is to prevent the too rapid crystallization of the boiling sugar; dissolve in a table-spoonful of water, and put it in as soon as the sugar begins to boil. Proceed to make the fondant by putting the water and sugar together into a stewpan or sugar-boiler, place on one side of fire, and stir slowly until the sugar is quite dissolved, but do not let it boil. It must be quite dissolved before commencing to boil. Then boil up rapidly on a fierce, clear fire. As soon as it begins to boil, dip your fingers into water and pass them round the inside of the boiler to wash down the dry crystals that have formed there by the water from the boiling sugar being evaporated by the hot sides, if they were to remain there, the fondant would be "grained" or crystallized, and therefore no good. When it has been boiling three or four minutes, and begins to throw up little pearling beads, dip a finger into cold water, and rapidly dip the finger into the boiling sugar and take up a little, gather it between thumb and finger, and if it forms a soft ball it is ready. Try with a thermometer, and when it registers over 235° Fahr., it is ready. It must not exceed 240° Fahr. When boiling, before it is ready, and after the sides are washed down with water, put the lid on for

a minute, so that the rising steam will be kept in and condense on lid and sides, and run down into the sugar, and by so doing ensure washing off the sides the forming crystals, which are so dangerous, by preventing smooth fondant. When boiled enough, have ready a slab, with pieces of square inch iron bars laid round to prevent the sugar running off, then sprinkle the slab with water, and pour the boiling sugar on to it, allow to cool for five minutes, and then with a good-sized wood spatula work about it rapidly, gathering it up from the sides into the middle repeatedly: work hard upon it until it turns into a white smooth mass like butter.

Note.—The lower the degree, 230° (so as to obtain smooth fondant), the more work must be put into it, but the better fondant will result in its being softer and more glossy and finer in grain. The more it is boiled, and the hotter it is worked up after poured on to slab, the quicker it will cream up, but the coarser will be the grain and harder. Where it quickly forms a crust while cooling upon the slab, let cool 100°, sprinkle over with water before beginning to work up.

When using fondant for glacé put the quantity required into stewpan and slowly warm it to about 80° or 90°. It must never boil or get very hot after it is made, or it will be altered to another kind of boiled sugar, and be no good for this work. Then dip the article into it, or pour it over if it is large, and put the goods quickly into a drying oven, or mouth of oven, for a minute to make the gloss perfect. If the fondant is too stiff when melted, reduce it with a little syrup (clarified sugar), which you shouid always have ready.

For chocolate glacé melt about one part unsweetened best confectioners' chocolate to two parts fondant, and when both are melted, mix together. If good chocolate is used, it will melt like butter. Add any other colouring and flavouring matter you need when the fondant is melting.

Fondant is also cheaper, and, of course, better to use in place of water icing, because the water has been boiled into it and crystals dissolved. A very little apple jelly, or other bright jelly, added to chocolate glacé makes it shine better.

Marzipan and Almond Icing.

Boil 2 lbs. sugar in half pint of water to over 300°, say 310°; when the sugar has had enough boiling, take off fire, and then beat in slowly 1 lb. almonds. This paste should be worked (by a machine, if you have one,) very smooth.

Berlin Buns (Dough Nuts).

Make a dough with 2 lbs. flour, 1 lb. 2 ozs. water or milk, 1 egg, ¼ lb. butter, ¼ lb. sugar, and 2 ozs. of yeast; rub the butter into the flour, and make the whole into soft dough. Let it ferment for two or three hours, then weigh into 2 oz. pieces, roll round, press thumb into middle, put into hole ½ teaspoonful of preserve, close it over by pinching tightly the dough up over and around it. Let prove for about ¼ hour, then have ready some good boiling fat, and drop the buns into it, and cook until light brown; take out, drain, and roll in castor sugar. To test if the fat is hot enough, splash into it a sprinkle of water—if hot enough, it will sputter and make a noise. It must be boiling, or the goods will absorb the fat and taste bilious.

Tartelettes aux Rhum.

Line a tartlet pan with one of the sweet short pastes; cut out thin, and fill with this mixture:—Beat up 18 yolks with 6 ozs. sugar, ¼ lb. ground almonds, 1 oz. flour, 1 rind of lemon grated; then stir in 2 table spoonsful of rum, 6 ozs. melted butter, bake carefully; when baked, turn upside down on to a sieve; when cold, spread top with apricot preserve, glaze thinly with white fondant, and place half a blanched almond on top.

Christmas Puddings.

Take 1 lb. breadcrumbs, 1 lb. beef suet, 1½ lb. currants, 1 lb. raisins, ¼ lb. sultanas, ¼ lb. lemon-peel, ¾ lb. moist sugar, 2 tablespoonfuls flour, 1 grated nutmeg, about two-thirds pint of milk, and 4 eggs. The raisins carefully stoned, the sultanas and currants quite free from stalk and grit, the suet and peel chopped *very fine*; the flour, breadcrumbs, sugar, and grated nutmeg should be placed all together in a pan, and mixed in their dry state. Whip the eggs in another vessel for a minute, mix with the milk, pour upon the other ingredients, and amalgamate the whole; put into buttered basins or moulds, fill quite up, make a thin paste (scrapings of pudding-pan and flour will do), and spread this over the top of the puddings. Lay note-paper upon the paste, cover the pudding with a cloth, tie it down securely, and boil it steadily six or eight hours. When done, take out of the water and let it stand five minutes, then cut off the top, turn out upon its dish, add sauce, and send to table.

Note.—If quite sure of the taste or palate of the probable eaters, add, when mixing, the usual glass of brandy, and enough ordinary mixed spice to cover a penny its own thickness; this gives rather a coarse flavour, and (as we have said in another place) is quite a matter of taste. Do not boil violently

('gallop'), but gently, and always err upon the side of cooking too much rather than too little, because the object is not only to cook the ingredients, but to bring out their flavour, and also to give that dark colour which is generally supposed to indicate richness.

Mincemeat.

Four lbs. raisins stoned and chopped fine, 4 lbs. currants, 4 lbs. sultanas washed, picked and chopped, 4 lbs. apples picked and chopped, 2 lbs. tripe and 4 lbs. suet chopped fine, 2 lbs. mixed peel chopped fine, 4 lbs. moist sugar, 1 nutmeg grated, 1 oz. powdered cinnamon, 1 pint strong brandy. Chop the apples with the fruit—it will prevent them sticking so much. When chopping the suet, avoid the use of flour if possible; also keep it from binding in a soft mass, keep it cool, and chop in small quantities. Mix all together, and keep in stone jars.

Calves'-feet Jelly.

Calves' feet are generally to be obtained from the butcher ready for boiling, but if it is not convenient to get them ready dressed, scald them with boiling water, leaving them in it a minute; then scrape the hair off, knock off the hoofs and split the claws, and take out all the fat to be got at, then wash them very carefully; put four feet to a gallon of water and boil down gently to about half, strain it, and let it get cold; then take off all the fat. After you have scraped as much as possible off, pour a little boiling water upon the top, shake it about, and then pour it off quickly. After you have done this, take some thin tissue or some blotting-paper and dry the top of the jelly. Then turn it out, and if there is any sediment at the bottom scrape it off also. This will leave about two quarts. Put this into a clean stewpan, with the juice of three lemons strained, some thinly cut shavings from the rinds of the lemons, ¾ lb. loaf sugar, a gill of white wine, the whites of 6 eggs beaten for a minute, throw in the shells also to help to clarify, and 2 ozs. of good gelatine. Put this on a cool part of the hot plate, or on a slow fire, and stir gently until it boils and begins to rise. When this point is reached, do not stir any more, but draw it a little on one side, and as the scum is thrown up by the boiling, remove it carefully. Do this for about a quarter of an hour, then draw still further away from the fire, and allow it to settle for another quarter of an hour. Now dip the jelly-bag in hot water, wring it out, and strain the jelly through in a basin. If the jelly, on account of some mismanagement, is not quite clear, strain it again. If it should be wanted rather richer, add a little sherry when boiled up the last time, and when strained keep it in a basin for future use, or run it into earthenware or glass jelly moulds, not metal, for fear of discoloration.

1d. Spice Cakes.

3 lbs. stale cakes rubbed through sieve, 3 lbs. flour, 1 lb. margarine, 1 oz. spice, 1 oz. ginger, 2 lbs. moist sugar, 1 oz. ammonia, rub these altogether fine, then add 6 eggs and enough milk to make a firm but workable dough. Pin out sheet ¼ inch thick, cut out with 3 inch cutter, wash over, lay half a blanched almond on top, and bake.

Tea Biscuits.

14 lbs. soft flour, 3 lbs. moist sugar, 3 ozs. ammonia, 3 pints milk, ¾ lb. margarine, rub together; add milk to make a light dough, pin out ¼ inch thick, cut with 2 inch cutter, and bake in sharp oven.

Dessert Sandwich.

Rub 14 ozs. flour with 10 ozs. butter and 3 ozs. sugar, add 4 yolks and a spoonful of milk, and make into a smooth dough; then make a paste confection for spreading by beating 3 ozs. butter and 5 ozs. sugar; add and mix well 5 yolks, 3 ozs. ground almonds, about half a gallipot of best cake crumbs (almond, Genoese, or sponge) moistened with a spoonful or two of milk; roll the short paste into a sheet ¼ inch thick, cut out with a round cutter (2 inch for twopenny sandwiches, 5 inch for sixpennies), lay upon baking tin and wash over with milk, spread thickly with the confection, but not too near the edges, cover with another round, fasten the outer edge and bake in a cool oven. When baked, spread with preserve, and mask either with fondant or meringue; ornament with fine tracings in fondant sugar and red currant jelly. To make either fondant or currant pliable for ornamenting, put some in a paper cone and in oven or warm place a minute to melt.

Dessert Baskets.

Make a paste with 8 ozs. fresh butter, 8 ozs. ground almonds, 8 ozs. sugar, 6 ozs. flour, 6 drops essence almonds, 4 ozs. cut dried cherries, and 2 ozs. minced angelica; rub all finely together and wet up with yolk of egg into rather soft dough; fill with this paste small, shallow, canoe-shaped tins about 3 inches long, 1½ broad and ¾ deep, and with sloping sides; bake in a fairly hot oven. When baked, cut the top off in a thin slice, cut it in halves to represent the basket covers, scoop a little out of the top of the cake after the cover is off, bend across, and well fasten in the sides a strip of angelica to form the handle, smear the inside that has been scooped out with preserve, pipe in some

whipped flavoured cream, pipe up buds of the cream in front, so that when the lids are put on they will stand two-thirds open and resting up piped cream; put a bloom on to the cream buds by a spray of carmine thrown from the stiff bristles of a carmine dipped brush, which will be easily effected by drawing a knife edge across the bristles towards the person, the brush being close to the cream; cover the lids with red currant jelly and lay them in position, which will bring the round point midway between the handle and the part of the cake it was cut from, and the two cut ends nearly or quite touching at the bottom of the handle. Now group some small or cut crystallized fruit on the join of the half lids at the bottom of the handle, also minute pieces of glacé cherry, angelica, and a silver dragee or two around the front to set off the white of the cream buds; the sides or some of the baskets can also be smeared with preserve, and covered in roasted cake crumbs, if preferred, for variety.

Royal Dessert Rusks.

Half pound finely cut citron, ¾ lb. desiccated cocoa nut, ¾ lb. flour, ¾ lb. sugar, 6 eggs, and 10 drops essence vanilla; well beat the whole, and pour on to a well buttered tin, with edges, to prevent running off, spread not quite an inch thick, and bake in a cool oven. When quite cool, cut as fingers for ordinary rusks, only smaller, and toast well in a sound oven.

Apricôs.

With a 2 inch diameter round cutter, cut out some pieces from a sheet of Genoese an inch thick, slice them and spread them with crimson apricot jam, sandwich them, pipe on top with meringue to represent an apricot, dust with fine sugar. Put in oven a minute to set, then stand on wire sieve over a bowl, and pour over warm crimson apricot syrup—see how to make—let it run freely off the meringue, but make the sides moist enough for cocoa nut to adhere well, lift from the sieve on to pale brown roasted desiccated cocoa nut, and with a knife draw it up the sides until covered. Put a sprig of angelica to represent stalk of apricot.

Note.—The apricot is also piped on with boiled meringue, and dusted with sugar, but not put in oven. The sides only are covered in pulp and cocoa nut, the meringue, on top, is then delicately sprayed with carmine to represent bloom by dipping a tooth brush into carmine, holding it towards the meringue, and drawing a knife over the bristles towards the person holding it, which has the effect of throwing a shower of red spray towards

the article by the rebound of the bristles. A dot of burnt sugar is put at one end for eye, and at the other a strip of angelica for stalk.

Petit Four Framboise (Raspberry).

Is one inch Genoese, cut into one and a half inch squares, sandwiched and masked in thinned acidulated raspberry jam, then dipped (top and sides) in raspberry fondant, stood to drain upon wires, and then the top ornamented alternately with white icing and red currant jelly in thin lines.

Lemon Filling for Cheese Cakes.

Half pound of castor sugar, juice of 2 lemons, 2 ozs. butter, 3 eggs, and the grated rind of 2 lemons; whip the eggs a little, and place with other ingredients into stewpan, stir and simmer till it thickens; do not let it boil.

Chocolate Filling, etc.

Mix 2 ozs. flour with a pint of milk, add 6 ozs. sugar, 2 ozs. unsweetened cocoa powder, or confectioners' chocolate, and 3 eggs; mix all well together into a stewpan; place it on the fire, stir it until it thickens, do not let it boil, take from the fire, pour into bowl, and then stir in a teaspoonful of vanilla essence.

Small Fancy Creams.

Make a sweet short paste by mixing 1 lb. fine flour, 4 ozs. castor sugar, 10 ozs. fresh butter, and 2 eggs into a smooth firm paste, roll into a sheet the thickness of a penny, cut out with a 2 inch diameter round cutter. Prick them to prevent bulging, place on tin and bake well, don't burn. Prepare a custard with ½ lb. castor sugar, 6 yolks and a quart of milk, by whisking all together over a good fire until it thickens; it must not boil; add 12 drops essence vanilla and 1 oz. soaked gelatine, and when nearly cold, beat the white of 3 eggs to a stiff snow, and stir them into the custard; pour into small ornamental wet moulds only large enough for one lady; put them in a cool place to set. When required, turn out by dipping in warm water the usual way. Place one on each piece of sweet paste previously spread with crimsoned acidulated apricot, pipe neatly with red currant jelly. Should sell well at the counter at 6d.

Presburg Zweeback.

Make a rich rusk by fermenting ½ lb. sugar, ½ pint warm milk, 2 ozs. yeast, 4 eggs, and a handful of flour for two hours; then melt 4 ozs. butter, pour into the ferment, and make a fairly firm dough with fine flour; after half an hour mould into long rolls

of about 2 inches diameter, flatten down a little, put into narrow square tins if you have them—if not, in the narrowest French roll tins you have, prove well, bake well, cut into slices ¼ inch thick and toast to a light brown; mix ½ lb. ground almonds and a ½ lb. sugar into a paste with yolk of egg thin enough to spread with a knife, spread each rusk thinly with this mixture, put them into oven to brown the paste and then in the drying oven until quite crisp.

Brioche Halfpenny Loaves for Shop Sale.

1½ lb. fine flour, 5 ozs. good butter, 5 ozs. castor sugar, 1 oz. cream tartar, ½ oz. carbonate soda, 2 eggs, not quite a pint of milk, and a pinch of salt; mix the same as soda scones, weigh into 1 lb. pieces, break each piece into 10 or 12, make into small cottage loaves, stand upon tin, wash over with yolk, and bake half an hour.

Indianas.

Prepare the following mixture: Stir 12 yolks with 6 ozs. sugar, whip up 14 whites to a firm snow, mix these together, adding carefully ½ lb. flour and one table-spoonful of water. Pipe as buttons, the size of a penny in diameter, on to paper, and bake very dry. Hollow out a little from the flat side, spread what remains of the flat side with preserve, also smear a little on the part hollowed out. Now place them together: it will then represent a ball more or less; cut off a little from one of the round ends to make it stand, make a hole through the part which has now become the bottom. Having now got the two halves hollowed out and fastened together, and one part with the piece cut off to make it stand, and a small hole through this part, dip it with the round and uncut top into coffee, chocolate, or raspberry fondant, covering it right down to the part that is cut off; stand it upon the cut part on a wire, and put inside the oven for a few seconds to make it shine, allow to cool and then take them between thumb and finger of the left hand, and from a bag fitted with a pipe, in the right hand, force cream, whipped, flavoured, and sweetened, through the hole in the bottom into the hollow part, and put cut off piece over the hole.

Honey Ginger Bread.

2 lbs. flour, 12 ozs. sugar, 4 ozs. each of finely minced lemon citron, almonds, and butter, a pinch each of cinnamon, nutmeg, and mixed spice, 1 lb. honey, ½ oz. carbonate soda, and a gill of water, put the honey with water into stewpan, bring to boil, rub the butter and other ingredients into the flour, make a bay, pour

in the hot honey and water, and make a smooth dough, roll it half an inch thick, place upon tin, let stand one hour, and then bake in cool oven; when baked, pour over it very thin vanilla fondant, and cut into shapes.

Germ Meal Dessert Biscuits.

2 lbs. germ meal, ½ lb. ground almonds, 12 drops essence almonds, 1 lb. butter, 1¼ lb. sugar, and enough eggs to make it into a firm smooth dough, roll out very thin, cut with coffee biscuit cutter or fancy cutter, and bake quickly in sound oven.

Lemon Rings.

3 lbs. flour; make a bay, put in 2½ lbs. sugar, ¾ lb. margarine, cream them up; add 5 eggs, essence lemon, ¼ pint milk, mix, cut out with 1½ inch cutter, with a smaller cutter cut out middle, and bake on tins in sharp oven.

Almond Drops.

4½ lb. flour, 1½ lb. margarine, ½ oz. powder, 5 lbs. sugar, rub together, make a bay, add 15 eggs, essence almonds, roll in long finger strips, cut off in ½ inch pieces, stand on ends ½ inch apart, and bake on tins in a cool oven.

Gateau de Macaroon.

Mixture: 1½ lb. ground almonds, 2¼ lbs. sugar, 12 whites of eggs well beaten, and must be only stiff enough to force through savoy bag; add 3 ozs. flour, and the juice of 2 lemons. If the mixture is too stiff, add another white of egg. Cover a tin with rice (wafer) paper, draw three circles about 8 to 10 inches diameter, spread each circle with macaroon ½ inch thick quite level. Pipe a forth circle with tube a nice design, then bake carefully. When cold, glaze each circle, except the top, with firm boiled apricot, coloured red. The top circle glaze with hot strong syrup to make it shine, do this as soon as it comes out of oven, put the top circle on the others, and decorate between the piping with red and yellow apricot and glacé fruit; bake a few macaroons, very small, with glacé cherry, etc., in middle, and stick them round the top. Edge and finish it off round the side by thin almond icing neatly fastened on them; chop some blanched almonds fine, brown them in the oven, and while very hot roll them about in a little hot clear syrup to make them shine, and then roll the side of gateau in them to cover the almond icing. Put this almond icing and the browned almonds on before putting the edging of small macaroons on.

Gateau Mocha and Coffee Cream.

Mixture: Make a cake batter by stirring ¼ lb. sugar with 2 yolks; whip four whites to a firm snow and stir it into yolks with a ¼ lb. flour and few drops essence vanilla and spoonful of rum, and bake in a buttered papered hoop. When baked, turn upside down on a sieve till next day. Then cut in three slices from side to side, not top to bottom, and sandwich together with mocha cream, prepared by slightly warming ½ lb. fresh butter and stirring into it 1¼ lb. icing sugar and strong essence of coffee. Put these in slowly, not all at once. Prepare the coffee essence by boiling ½ lb. best coffee in a pint of water for ¼ hour. (Bottle the remainder for future use.) The coffee cream, when finished, must be stiff, and stand up like icing when sandwiched together with this; cover the cake with it thinly, and smooth with knife; brown, glaze, and chop almonds as in preceding recipe, lay them with a knife up the sides of the cake thinly, put some of the cream into a small star tube, and pipe a design upon top.

PICK-ME-UPS.

PUT a ½ teaspoonful of ground ginger, a ½ pint water and teaspoonful of beef extract into stewpan, and make hot, add a ½ pint of good old claret and boil up, season to taste with salt—sugar can be used for a change—let it cool down a few degrees and then whisk 2 yolks of eggs. Drink slowly from a spoon.

2. Put 1 lb. of the coarsest oatmeal into 3 or 4 quarts of water, boil for a few minutes, stir in teaspoonful of beef extract, season well with pepper and salt, let get quite cold, and drink a small teacupful occasionally during the night's baking.

3. Crush 1 lb. of red currants or strawberries, add 2 quarts water, juice of 1 lemon, a ¼ lb. sugar and ¼ ounce carbonate soda, let stand 1 to 12 hours, strain, put on ice, and drink half a glass when thirsty.

4. Add to 4 quarts of boiling water 1 oz. ground ginger, a pinch of cayenne, 4 drops essence of lemon, a pinch of tartaric acid, 1 lb. of sugar; when cool, bottle, drink either hot or cold. It is very stimulating drunk quite hot.

5. Take ½ lb. cold meat—no gristle—chop up and pound it fine, boil and add a sheep's brains, season with salt and pepper, stir in 1 good sized onion, chopped fine, and yolks of 3 eggs, boil ½ lb. rice nice and dry, add 1 oz. of butter and a little grated nutmeg, put into a shallow dish, spread the minced meat upon it, drawing the rice up over it; then bake in a moderate oven, eat with cauliflower and potatoes.

6. Roast a chicken; cut all the meat off and free from skin and hard pieces, put into a stewpan with ½ pint of water, a teaspoonful of beef extract, 2 cloves, an onion, and sweet herbs; stew half an hour, take out the meat and strain the liquor; put the meat and strained liquor back into the stewpan, with 1 oz. butter, the juice of half a lemon, a pinch of salt, and a gill of milk, simmer and stir for a few minutes, and eat with dry toast (or wholemeal bread), potato, and cauliflower.

7. Put in a stewpan 6 ozs. macaroni and a pint of water, boil slowly one hour, drain off the water, add 2 ozs. butter and 4 ozs. of grated Parmesan cheese, mix a tablespoonful of flour in a pint of milk with a pinch of salt, and 2 or 3 grains of cayenne, stir the whole together, put into a buttered dish, grate 2 ozs. more cheese over the top, and put into oven to brown for a quarter of an hour.

Invalids' Jelly.

1. Toast a ½ lb. of the crumb of wholemeal bread, place it and its crust in a stewpan with 1 quart of water, and boil slowly for an hour. Pass it through a hair sieve, add sugar to taste (about 4 ozs.), ½ pint good port, juice of 2 lemons, 2 ozs. dissolved gelatine. Mix well and put into small moulds.

2. Place in a stewpan 1 oz. beef extract, a pint of water, 4 ozs. sugar, the juice of 2 lemons, a very small piece of cinnamon, and simmer till beef is dissolved; melt an ounce of gelatine, stir it into the cooling extract, add ½ pint sherry, and strain into small moulds to be used as required.

Ginger Beer.

Pour 6 quarts of boiling water upon 1 lb. sugar, 2 ozs. bruised ginger, and a pinch each of tartaric acid and cream tartar, stir up and leave for six hours, then stir in a tablespoonful of liquid yeast, and 1 whisked egg white; let this work for twelve hours, strain and bottle, tie the corks and lay on side. It will be ready in twenty-four hours.

Gingerade.

Well dry and mix 2 lbs. of fine or pulverized sugar, ½ lb. tartaric acid, ½ lb. carbonate of soda, ½ oz. ground ginger, 12 drops essence of lemon, keep in an air-tight bottle, and use a full teaspoonful of the mixture to a glass of water.

PRACTICAL HINTS FOR WEDDING BREAKFASTS.

THE first thing to be observed, after determining the number of invited guests, is to see that there will be comfortable sitting-room for all, for a crowded guest-chamber is a pregnant source of annoyance and discomfort, and particularly so to ladies, who have a great and not unnatural horror of having their dresses creased or crushed. I never allow less than 18 inches sitting room for each person, and prefer to allot 20 inches, particularly when cane-seating is furnished. Of course, when chairs are provided, the question is readily solved. It need scarcely be mentioned that the table must be of proportionate length, and for a room of limited dimensions I would suggest a table of not more than 3 feet wide, should this with other furniture have to be hired.

Thus, for forty guests, a room would be required at least 22 feet wide by 24 feet in length. In this space the best shaped table would be one of "horseshoe" form. This would give 15 feet outside measurement, and 12 feet inside. Such a table would give comfortable sitting room for forty—nine persons (20 inches each being ranged on the outsides, and seven persons on each of the inner sides; while six persons would occupy the cross-table, and one person each of the two ends.

Following out this idea of a "horseshoe" shaped table, I would hint that the table-cloth on the cross-table is better spread before the long table is brought close, as this gives a neater appearance, and avoids the ugly bulge at the inside corners. Each guest must have two plates, two knives, two forks, two dessert spoons, three wine-glasses, a napkin, and finger-glass; and it is usual to put one tumbler to every other person.

The table being ready, I now proceed to submit a few suggestions with regard to the dishes usually served throughout the year according to the season.

And first I would remark that of late years it has become the fashion to serve one or two light seasonable soups, such as asparagus, brunoise, carrot, green-pea, julienne, ox-tail, Palestine, spring, clear turtle, white soup, etc. Plain roast chickens and ducks are always standard dishes, the former being cut on the under side, and tied with white satin ribbon, finished with a bow or rosette, and garnished simply with parsley and vegetable flowers; it is also usual to put small paper frills on the legs. Other dishes in order would be the galantines—for example, those of turkey, fowls *a la tortue*, lamb or Muscovy duck, veal; various

kinds of game, ornamented with its own plumage, or otherwise like the other galantines with aspic jelly in the three colours—amber, ruby, and green. Designs formed with truffles cut in different shapes and placed on some of the galantines, have also a very pretty effect. Then follow tongues and hams modelled or decorated with aspic jelly; aspic fillet of sole, lobster, eel, pigeon, quail, etc.; game, chicken, pigeon, and other pies; Montpelier eel, mayonnaise of salmon and lobster, bechamel and mayonnaise fowls, pigeons as doves, patties various, prawns and plovers' eggs mounted, fancy, French and Italian pastry, ornamented Savoy cakes, gâteaux various, tourtes with ornamental covers, jellies and creams, trifle, tipsy cake, fruits various fresh and preserved, and water and cream ices.

The bride-cake, which is always the principal object of attraction at such functions, should be as ornate as possible, and placed on a stand in the centre of the cross-table. Wedding or bridal bonbons, in white and silver, should be freely distributed over all the table.

In further ornamenting the table, I would suggest a liberal use of flowers, and a very pretty effect is produced by placing a button-hole bouquet in a small fancy glass before each guest. The bride and bridesmaids' bouquets might also be placed at intervals down the centre of the tables.

For forty guests three or four waiters or attendants would be required. If tea or coffee is provided, it must be served directly the guests sit down; but it is now more usual to serve coffee just before the bridal party breaks up. If soup is on the menu, it must be served (directly the guests are comfortably seated) by the waiters from the sideboard. A small menu card, with the name of the guest written on it, should be placed on each plate, and it is very desirable that a lady and gentleman should be seated alternately at the table, so that the dish that is opposite, or nearly so, may be served by the gentleman. The champagne should be well iced, and the other wines should only be decanted just before the guests sit down.

For effect, it is rather important, in putting the various dishes on the table, that each sort should be as far apart as possible. Thus, if there be a galantine of turkey, it should be put at one end of the long tables, then another galantine on the cross-table at the other side; and if there are more galantines or game or meat pies, they should be placed near the centre of the long tables, with a ham or tongue in close proximity. The chicken and ducks should be placed single and not near each other. Aspic jellies and salads alternately, creams, jellies, and fancy pastry distributed generally over the tables; the gâteaux and other cakes put on some of the centre high dishes, as also the fruit. The ices are served round.

WEDDING BREAKFAST MENU.

Tortue Claire.
Bisque d'Ecrevisses.
Filets de Soles Montpellier.
Darne de Saumon en Belle Vue.
Salade de Homards.
Aspic de Foie Gras.
Chaudfroid de Mauviette.
Filets de Bœuf à la Gelée.
Médaillons à la Moderne.
Poulardes découpées.
Galantine de Volaille.
Bœuf braisé. Langue de Bœuf.
Jambon d'Yorc. Salade à la Russe.
Pâté de Cailles.
Gelées aux Fruits et aux Liqueurs.
Crêmes variées.
Corbeille de Fruits glacés.
Gâteau Neapolitain.
Patisserie Parisienne.
Glaces. Dessert.

DINNER MENUS,

At 5s. if for 100 *or over.*

Mock Turtle. Clear Spring.

Salmon and Lobster Sauce.
Whitebait, Plain and Devilled.

Compôte of Pigeons.
Mutton Cutlets, Piquant Sauce.

Boiled Capons. Roast Fowls. York Ham.

Fore-quarter of Lamb. Haunch of Mutton.
Dressed Salads. Asparagus.

Petits Fours, Glacé and Various.
German Puddings. Macedoine Jellies.
Pineapple Creams. Maids of Honour.
Compôte of Oranges.

Ice Puddings.

DESSERT.

SOUPS.

Tomate Américaine. Brunoise.

FISH

Supreme of Sole Hollandaise.
Whitebait.

ENTRÉES.

Lamb's Sweetbreads au Gratin.
Chicken Sauté à la Paysanne.

REMOVES.

Haunch Mutton and Red Currant Jelly.
Brussels Sprouts. Plain Potatoes.
York Ham and Maderia.

ROAST.

Pheasant Bardé Sur Croustade.
Chipped Potatoes. Cauliflower.

ENTREMENTS.

Cherry Pudding Feuillentine à Macédoine Jelly.
Ices. Apricots.
Cheese. Celery.

DESSERT.

BAKING POWDERS FOR BAKERS' AND CONFECTIONERS' USE.

WHEN making these powders and flours, if for storing, use maize starch, which will prevent them becoming lumpy. Moisture destroys their power by decomposing and liberating the gas. Tartaric acid is about double the strength of cream of tartar. It effervesces very quickly. It will generally be found to neutralize carbonate of soda better in equal quantities, or if used with sour milk for scones the acid in the milk must be allowed for, say five parts soda to four parts acid. Cream of tartar will neutralize half its own weight of carbonate of soda. Those who clearly understand this principle will have no difficulty in making up any quantity of powder. If the goods look yellow and smell strong, there is too much soda or too cold an oven, and more acid must be added to the powder. If they have smooth, shining, and slightly slate-coloured surface or edge, you will probably find it is caused by an excess of acid. It will taste sour, and the powder must have more carbonate put to it.

RECIPES.

I.—Baking Powder.

2 lbs. cream of tartar; 2 lbs. tartaric acid; 4 lbs. carbonate of soda; 2 oz. of ammonia; 4 lbs. maize starch. All particles of carbonate and acid should be powdered, the whole of the ingredients well mixed up together, and sifted through a hair or other fine-mesh sieve; pack and keep from damp. For scones use ¾ oz. to 1 lb. flour.

II.—For Good Self-raising Flour.

Well mix together the whole of Recipe 1, with 280 lbs. of dry roller whites, slightly granular preferred. When the flour and baking powder are mixed together, sift through a fine sieve to make sure it is thoroughly amalgamated. Keep from air and damp.

III.—Scone Flour.

40 lbs. flour; 1½ lbs. cream of tartar; ¾ lb. carbonate of soda. Mix as before, and it is ready for use.

IV.—Bakers' Prepared Flour for Cakes.

15 lbs. flour; 4 oz. carbonate of soda; 2 oz. cream of tartar; 2 oz. tartaric acid. For ordinary cakes use ½ oz. to 1 lb. of flour.

V.—Baking Powder.

1 lb. maize starch; 1 lb. carbonate soda; 6 oz. tartaric acid; 1 lb. cream of tartar. Mix as before; use as No. 1.

N.B.—Maize starch is used in these receipes for the only purpose of keeping dry. Moisture, of course, has a destructive effect on baking powder.

INDEX.

RECIPES.

ILLUSTRATIONS.

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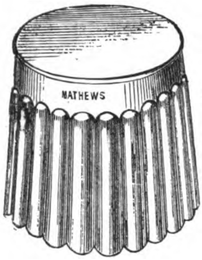

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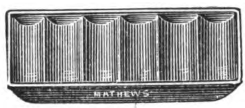

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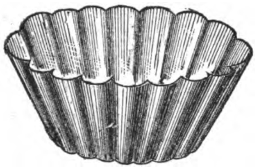

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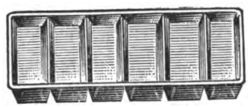

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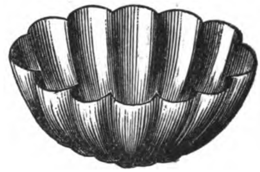

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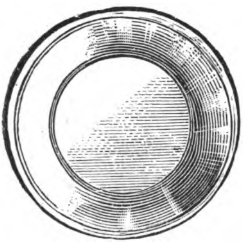

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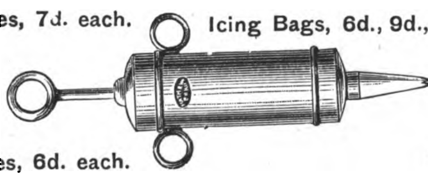

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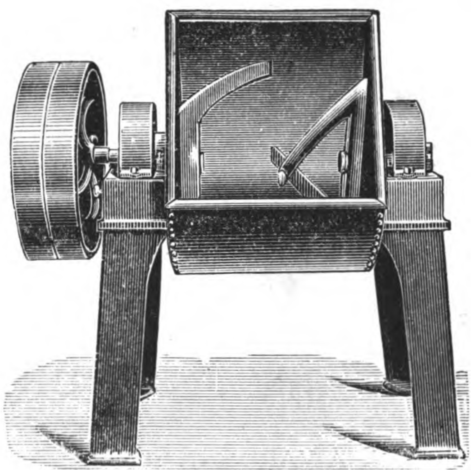

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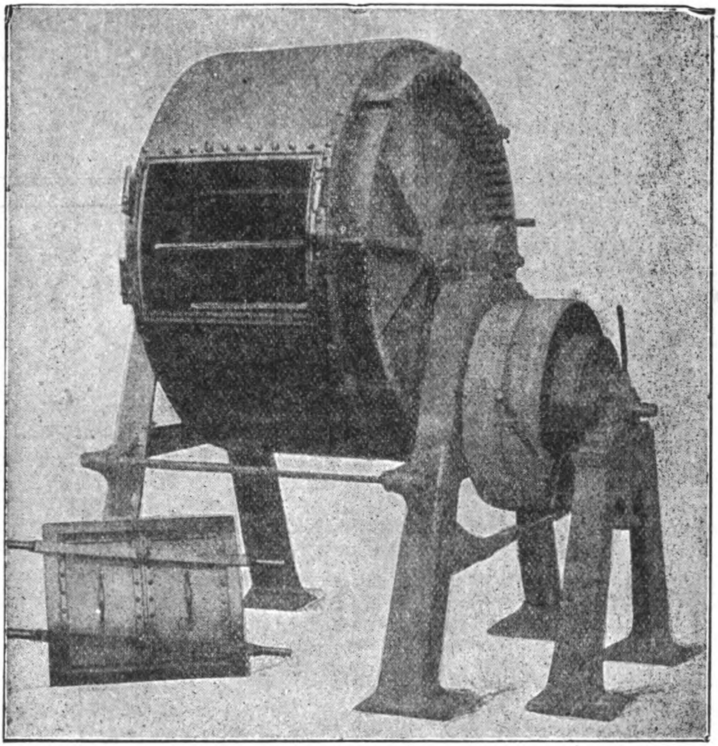

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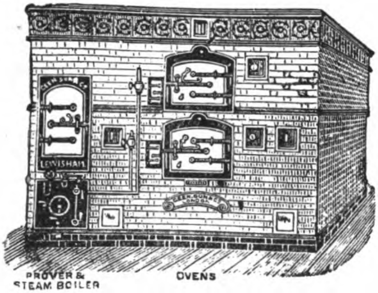

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are built in one, two, or three decks, all heated from one fire, which may be placed at the back, front, or on either side ; a tall chimney is not required, and only 6 cwt. of coke is required for 15 cwt. of coal wanted in other ovens. There is no fire in the bakehouse unless the oven is fired from the front, which rarely happens, so the bakehouse is free from all dust and dirt. The ovens are unequalled for all kinds of baking ; they bake bread set close, usually called "batch" or "set" bread, as well as cottage or tin bread, and are unequalled for all kinds of cakes, confectionery, pies, biscuits, fancy or plain. You can regulate the oven to a degree of heat for every class of goods. Bread is beautifully browned in the ovens, and the loaves are large, light, and perfect in shape, never being drawn on one side ; the oven being steam-tight, only the smallest particle of the weight of the dough escapes in baking, thus saving in weight two or three ounces on every four-pound loaf, and the bread is naturally so moist that it keeps many days longer than with other ovens. Bread seven to ten days old is quite moist and fresh. The oven is continuous in baking, no waiting being necessary between each batch, and the goods can be baked any time, night or day, without delay in refiring. Save their cost in less than twelve months. Easy terms of payment. A signed guarantee with each oven. Keep them in repair six months free of charge, and afterwards for only £1 a year. We have built more ovens than any other firm, they can be seen in any part of the country, and on application we will send, free of charge, a full description of the ovens, prices for all sizes, testimonials. Pay your railway fare to see them, whether you order one or not.

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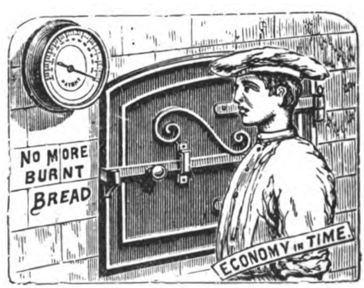

No change has taken place in the ownership, management, or staff of our firm, but the name has been shortened from M. Geen, Son & Co. to

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